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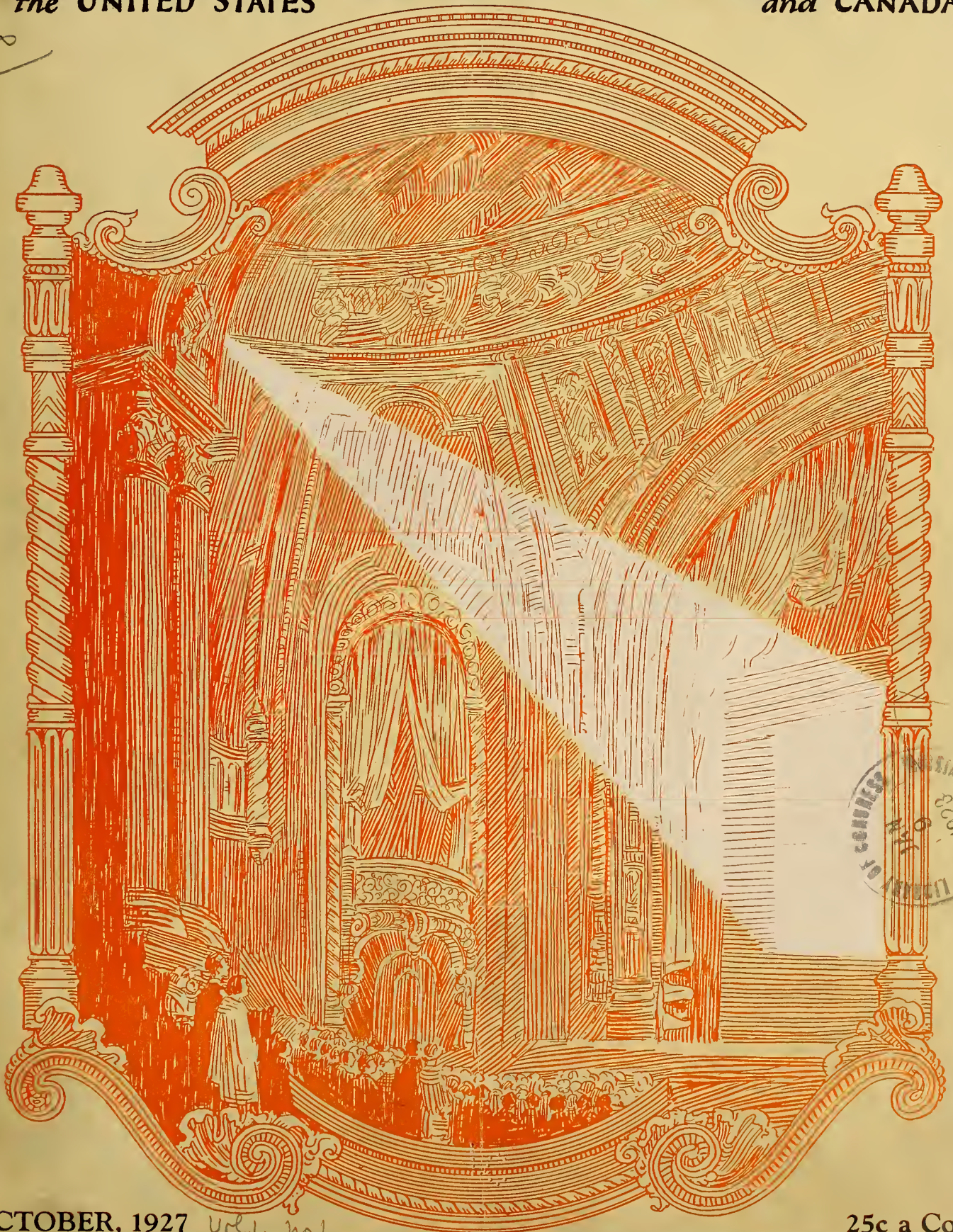
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THE MOTION PICTURE PROJECTIONIST

of the UNITED STATES

and CANADA



OCTOBER, 1927 Vol. 1, No. 1

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UNTIL THIS TIME there has been no connecting link between Projectionists and the vast world of scientists, engineers, laboratories engaged in perfecting or inventing better projection equipment or in explaining the real possibilities of projection equipment now in use. New thoughts, ideas, developments were taking place all the time but no national medium was in existence through which to pass this information on to the men in projection rooms.

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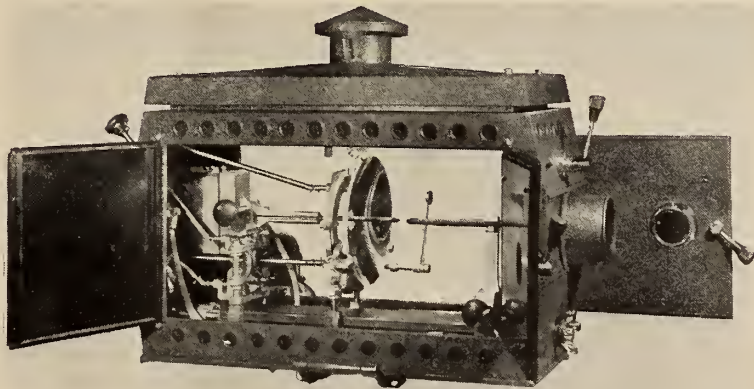
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FREE use of the columns of THE MOTION PICTURE PROJECTIONIST is extended to all Projectionists in this country and in Canada for the publication of news items, feature items, photographs, etc. No articles of political or controversial nature will be accepted but everything else that will help to entertain or to instruct will be gladly published and full credit given. Whenever possible send the following:

News Items about yourself and other Projectionists. Report as often as you can the progress your Local is making. Pass it on to the rest of the boys in the country.

Feature articles on the Science and Art of Projection from your own experience. Be entertaining if you like or be instructive. Send along all photographs or diagrams that go with it.

Pictures of yourself.

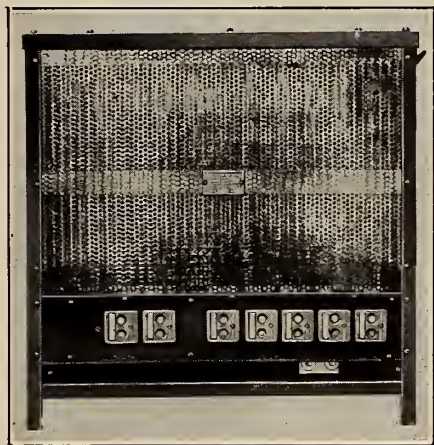
Reports of stunts you have devised for your booth to make projection easier or more efficient and diagrams of these stunts.

Questions about Projection problems that bother you. They will be answered promptly by experts in a special department called Questions and Answers about Projection.

News from Locals will be published under a heading devoted exclusively to the Local from which the news comes. Every Local in the country will have its own corner in this publication.

The Strongest Endorsement for Perfection Rheostats

is the representative theatres which have installed them



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| New Capitol | Binghamton, N. Y. |
| Keith's Theatre | Philadelphia |
| Carman Theatre | Philadelphia |
| Proctor's Theatre | New Rochelle, N. Y. |
| Proctor's Theatre | White Plains, N. Y. |
| Oriental Theatre | Detroit, Mich. |

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|-----------------------|-----------------------|
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Letters From Readers

From the day The Motion Picture Projectionist was first announced we have been receiving many letters daily, from projectionists, manufacturers and dealers, all of them enthusiastic and filled with good wishes. The letters from Projectionists pleased us the most—and we are publishing a few of them and will continue to publish them in each issue. We could fill pages with letters we already have but space is limited. To everybody who has written we extend our deep thanks.

—The Editor.

From Earl E. Robinson, Ottumwa, Iowa.

I assure you that I will do all in my power to have our organization signed up 100%. I have the sample copy you sent me sometime ago and I think it is a wonderful magazine.

From H. E. Meinscher, Temple, Texas.

The projectionists of this Local were very much enthused and indeed delighted to hear that a true Projectionist publication in "The Motion Picture Projectionist" was to be published and believe me when I say that I believe that the projectionists of this Local will subscribe to it 100%. Please accept our congratulations on this splendid move to give the projectionist of the United States and Canada a publication worthy of the support of all the men in the business all over the country.

In conclusion we extend to the publishers of "The Motion Picture Projectionist" the very best wishes for the continued success of their undertaking and pledge them our hearty support and co-operation.

From Ralph E. Johnson, Aurora, Illinois.

I am enthusiastic about a magazine like "The Motion Picture Projectionist" as this is an extensive trade and there is no reason why this craft should not have a publication all its own.

From Earl Calvin, Kokomo, Indiana

Your communication at hand regarding the MOTION PICTURE PROJECTIONIST and will say it is what our entire organization should have and would like to have a copy as soon as possible and will use every endeavor to see that our entire membership gets behind it and boosts it. Hoping to receive one as soon as published, I remain,

From Frank Jones, Chief Projectionist, Richmond Theatre, Alexander, Virginia.

Just a few lines to your magazine. I hope that the MOTION PICTURE PROJECTIONIST will be a great success and that every member of all the locals will subscribe to it.

Wishing it the best of good luck,

From Henry McNamara, Sault St. Marie, Minn.

Yours of the 17th to hand.

This is a joint Local with half in Canada and the other half in Michigan, each side of the river takes care of their own business. However I can assure you that all of us want the magazine and I'm sure that the Canadians feel the same.

How can you publish a really worth while magazine for \$1.50. Personally I don't see how it can be done. I would be willing to pay \$7.00 a year if it covered the field.

Us fellows way out in the sticks certainly need it. We never have the opportunity of seeing new ideas the first thing and at this time haven't hardly any way to read of them except from occasional advertisements.

Only the other day the manager asked my opinion on a certain lamp just introduced at the time. I hadn't even a good picture of it and absolutely no technical description. How can a man give good advice regarding new equipment when he doesn't know anything about it and has no way of finding out except through the companies own advertising.



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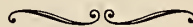
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THE MOTION PICTURE PROJECTIONIST

"A Magazine Devoted to Projection and Projectionists"

OCTOBER, 1927

Founded 1927

Vol. 1, No. 1

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FRANK R. DAY }
TONY DE BELLIS, Art Editor
JAMES H. DAVIE, Business Manager

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Prepared by the Eastman Kodak Company

Effect of Motion Pictures on the Eyes by Guy A. Henry

Talking Movies by James R. Cameron

Wiring Diagram of a Modern Projection Room

Special Blue Print Section

And other features including Permanent Dealers and Manufacturers
Index, Letters from Readers, New Equipment, News from the Locals,
Pictures and many more interesting and informing items.

Note: The Motion Picture Projectionist does not assume responsibility for
the statements and opinions appearing in signed articles in its columns. The
leading experts in each phase of projection are asked to contribute and they
are free to express their own theories and experiences. Accuracy alone is
insisted upon.

"In the Projectionist's hands is the power to make or mar the pictures they receive."

—THOMAS A. EDISON

A CHAT WITH THE EDITOR



Let there be Light!

WITH this issue *The Motion Picture Projectionist* makes its bow before the vast army of Projectionists in this country and before the Projectionists of Canada. It is the sincere hope of its editors that it may become of increasing value and service to the Projectionist craft which has certainly deserved an organ devoted exclusively to it long before this. The publication will appear monthly and already counts sufficient subscribers to justify its appearance.

At the very beginning of its career we wish it to be understood that this is not a motion picture trade paper. It is strictly a craft paper, published in the interests of the Projection craft and may be considered an addition to the growing press which is serving the interests of master craftsmen of the United States. It is aimed only at the Projectionist and is not interested in the problems of the motion picture industry that are not the problems of the Projectionist. Wherever the Projectionist is concerned, there this publication promises to be in to the finish, fighting lustily for him, bringing to him information about projection gathered from the four corners of the earth to enable him to become more expert and to better his condition in life, entertaining him whenever possible, but always constructive, worthwhile and efficient. Let this paper become the voice of the mighty Projectionist craft, let Projectionists speak through it and let it speak for them. Only one reservation the editors make: that the paper shall not engage in political or personal controversies that may engage the interest of Projectionists from time to time. It is obvious that it must hold itself

aloof from all matters that may compromise its proud impartiality or lessen its usefulness in its single purpose to help the craft as a whole and each Projectionist singly to become a better craftsman.

Before we tell you how we propose to achieve this let us tell you why this paper is so necessary. It is estimated that there are nearly 30,000 Projectionists including those in Canada, a really huge number deserving the attention and the respect of exhibitors, manufacturers and dealers. But although the motion picture industry has half a dozen big papers and about twenty sectional small papers not one of them give Projectionists their proper proportion of space. Some of them ignore him completely although they cater extravagantly to the exhibitor, the manager, the distributor and the advertiser. Those papers that do devote a little space to Projection (not to the Projectionist) address themselves not to the Projectionists but to the exhibitors. It is no exaggeration to say that because the Projectionist lacked a voice he was being ignored by all other sections of the industry.

It was really an almost incredible situation. Here are the best American and European scientists and engineers busily engaged in numerous laboratories turning out improvements and constantly increasing the efficiency of projection and where was the paper through which to broadcast these things to the Projectionist—the man most vitally concerned? For after all, the instruments may be wonderful but unless the human hand that guides them is instructed how can they be operated at their topmost efficiency?

Wherever you look about, you find the master crafts well fortified with instructive craft journals. The electrician has his publication, so has the printer and the plumber and so have nearly all the skilled crafts. Isn't it time that a craft requiring the precision and skill that Projection requires today should have its own journal devoted exclusively to its interests?

Again, Projectionists had no medium through which to exchange views with each other and by which to keep informed of the progress of brother craftsmen elsewhere. Wherever Projectionists gather, whether it is in societies formed to hold lectures or whether it is in their Union Locals, they are everywhere doing, achieving, progressing. If we were to list the progress made by Projectionists in various cities during the last several years it would make an imposing and really human document showing the climb upward of a great craft led by fine splendid men. Nor is it devoid of the romance that inspires. If only some medium had been in existence to pass that inspiration on nation-wide it would have given courage to others to keep on doing, achieving, progressing. To refer again to the trade papers of the motion picture industry, in them exhibitors and producers and distributors have a fine medium for the exchange of trade and personal information, but did the Projectionists?

Now how do we intend to make this journal fulfil its destiny—that is, to be of worthwhile service to Projectionists?

Well there are laboratories with their scientists and engineers to draw upon for enlightening information. There are the Projectionists themselves, many of whom are engaged in private research and from time to time make very valuable contributions to Projection efficiency. There are the manufacturers who ought to explain their merchandise with painstaking detail so that their value in the projection room might be increased.

But above all there is Projection itself—made up of many exact sciences each offering a fertile field for the editor and making absorbing, thrilling reading. After all, an editor's duty is to keep digging for material and in the projection field it is plentiful. Nor need it be dry-as-dust. Any readable work on science, no matter which one, is more gripping than the most thrilling fiction yarn. The unseen forces that twist and turn this world and that upset the best plans of mankind are our most fortunate inheritance. They help to enliven the world of the mind which feeds and grows on these mysterious marvels always beckoning but never fully revealed.

Well, the spotlight is on. Let the show begin.

THE EDITORS.

Skill, Knowledge and Experience

It is encouraging to see the growing number of Projectionists who are working on improvements for existing projection equipment or bringing out new inventions to improve its quality and efficiency. Sit with a group of Projectionists listening to a lecture dealing with some abstract theory of a phase of Projection or viewing a demonstration of a new piece of Projection equipment and you are amazed at the depth of scientific knowledge and familiarity about their craft exhibited by them. When men are no longer satisfied with mere manual dexterity but seek and discover the reasons why their tools and instruments operate, then you may be sure you are dealing with the highest type of crafts-

men without whom all engineering projects and laboratory efforts would come to nothing.

Mr. Hall of Hall and Connolly, whose new High Intensity Lamp is described in this issue, admitted recently that the new lamp was built only after the suggestions of many expert Projectionists had been solicited and received. This same story could be told by other equipment manufacturers—it is the experience and the knowledge of the men who actually use the equipment that counts and it must not be forgotten by these same manufacturers that it is the experience, the knowledge and the preference of these Projectionists that is solicited by the exhibitor when he is about to replace a piece of old equipment or buy an additional one.



THE NEW MAGNIFICENT PARAMOUNT THEATRE AND OFFICE BUILDING ON BROADWAY, NEW YORK—THE MECCA OF THOUSANDS OF OUT-OF-TOWN VISITORS DAILY—THE PRIDE OF NEW YORKERS—THE SHOW WINDOW OF THE MOTION PICTURE INDUSTRY.



A PICTURE HOUSE TWENTY-FIVE YEARS AGO. NOTE THE CHICKEN COOPS TO THE LEFT.

Recollections of An Old-Timer

By MAX HOLLANDER

TWENTY-FIVE years of activity in one craft is considered a long term of service. In case of the projectionist craft, one who has seen twenty-five years of service may be properly considered to have "grown up" with his trade. I am one of those—and our ranks are mighty thin today—who have "grown up" with the industry; and, at the invitation of the editor of *THE PROJECTIONIST*, I have endeavored to set down on paper a few reminiscences of those early joys so full of romance and color to me at least. I am still a projectionist—and I confess I often have a keen desire to relive those interesting times again.

After the termination of the Spanish-American War I returned from the Philippines and, having chosen electricity as a profession, entered the Baron de Hirsch School in New York. Upon my graduation, I secured a position as assistant electrician with the Vitagraph Company, then engaged in producing motion pictures in the Morton Building at 116 Nassau Street.

The headquarters of the Vitagraph Company of those days provide a startling comparison with the skyscraper homes of the picture companies of today. Three small rooms in the Morton Building on Nassau Street housed the business office, the film room and the manufacturing shop. Atop the same building was the studio where the films were made. Thus, from one building came the finished production, the equipment necessary to exhibit the picture and the business direction required to conduct the "industry"—quite different from the mammoth studios of today on the West Coast, the towering home-

office buildings in New York, the many exchanges scattered over the country, the foreign offices and the many other agencies and activities of the motion picture industry of today.

While at the Vitagraph plant, I made the acquaintance of John French, superintendent of the shop, who urged me to become a projectionist. Among those who were active projectionists at the time were Fred Nordstrum, Frank Day, Frank Lawrence, Fred and Max Held, Ruddy and J. S. Buchardt, Joe Becker, Maurice Brenner, Harry Bailey and Paul Ament. Some of these are now nationally known projection experts.

Following French's advice, I took projection lessons evenings at the Vitagraph shop. After three months work I was considered competent and was given an assignment.

My first one was at Jackman's Ride, a scenic railroad, which was situated on Surf Avenue, Coney Island, opposite the old Culver Station. The picture was not the principal part of Jackman's program. It was only used as a ballyhoo. It was projected from in back of a screen which was set up at the entrance to the Ride to attract the crowd to the entrance. When the manager thought the crowd big enough, the picture was stopped and the hawker started exhorting the crowd to enter inside.

In those days there were probably not more than fifty projectionists in the country, and certainly less than a hundred. The projection equipment consisted of a hand-driven mechanism, a wooden table with collapsible legs, upon which the machine was set; reels made of galvanized

iron, cables for the power hook-up, a cloth bag for catching the film as it unwound from the machine, a screen, usually made of two or three sheets sewn together; an asbestos cloth which was hung from four rods set into the floor, the "booth" of those days, and a few tools. The asbestos cloth was not always used, some projectionists operating in the open.

All this equipment, which was the property of the Vitagraph Company and rented by them for exhibition purposes, was portable and almost always was trans-



MAX HOLLANDER

ported to the place of exhibition by the projectionist. Imagine, if you can, our projectionists today trundling into a subway or boarding a street car with a machine in one hand, a screen under his arm, several lengths of cable across his shoulder, the show, in a small box, hanging around his neck, a bag stuffed into his pocket, and his tools—and you have an almost perfect picture of ye old-time projectionist sallying forth to work.

Machines of those days were hand-driven and did not include such things as motors, speed indicators, generators, arc rectifiers, take-ups, fire shutters or economizers. The machine itself was not developed to the extent it is today. In many instances there was no screen available. A coat of white paint on a wall or a white plastered wall served as well. At that time, a white wall was often better than a screen or linen cloth, which was semi-transparent and lost a great deal of light. The low amperage of those days was handicap enough in itself without inviting further trouble from loss of light.

At the end of the summer season at Jackman's Ride, I returned to the Vitagraph office to await my next assignment. This office was the gathering place of projectionists who were not working and many were the idle hours we passed in the little office at the front of the

building waiting for a call that perhaps would send us out on a local job or send us hurrying home to pack our bag for some distant place.

Salaries being what they were in those days—a week's pay then was hardly more than what is now earned on certain jobs in one day—we often lacked sufficient funds to tide us through our periods of inactivity. On such occasions an appeal would be made to the office bookkeeper, who kindly advanced us small sums—provided we agreed to pay him five per cent interest on the loan.

And sometimes when we were idle, G. M. Anderson (Broncho Billy), would use us as extras in his pictures. Anderson was directing and acting in Vitagraph pictures which were soon to make his name famous throughout the country.

I suddenly decided to strike out for myself as an exhibitor. In company with a partner, Fred Freed, I went to the Thousand Islands; and shortly after our arrival there we had completed negotiations to play a circuit of six towns, one town a night. We transported ourselves and our effects from one island to another by means of a motorboat.

One of the best towns on our "circuit" was Frontenac, where a splendid hotel and many natural advantages drew the best class of visitor. We charged no admission to our show, but passed a basket during the intermission and almost always cleared an average of \$250 a night.

As Frontenac had 550 volts current, it was necessary to devise some means of reducing the voltage to suit the requirements of our show. I finally hit upon the idea



LYMAN H. HOWE (right), PIONEER
TRAVELLING EXHIBITOR.

of placing upon the porch of the hotel a barrel of water into which I placed two copper plates six inches square, one connected with the mechanism and the other to the power source. By regulation of the distance of one plate to another I secured the proper voltage to project the show. As a cooling agency, a steady flow of water into the barrel was maintained. But my little scheme had other faults.

The flow of water from one of the hotel attachments into the barrel, naturally caused a ground on every faucet in the hotel. One night while the show was running the manager of the hotel dashed in and gesticulating wildly, shouted at me that one of his lady guests while taking a bath, had been "shocked to death by your damn contraption." He insisted that I stop the show at once. I declined, on the ground that the damage had already been done and there would be nothing to gain by stopping the show. Needless to say the lady wasn't shocked to death. She suffered little from her experience.

But the following week when we arrived to give our show we found large placards hung in the hotel rooms announcing that no water was to be drawn during the time the show was running.

One other incident in connection with our use of the barrel deserves mention. I had been in the habit of admitting free to the show a small boy who performed various odd jobs for me. Being very busy one evening, I quite overlooked the lad as he stood near the entrance at show time. The show was begun, but it had not progressed long when suddenly my light went dead. Immediately my thoughts turned to the water barrel outside.

Running out to the porch, I saw the last of the water trickling from the barrel, and, some distance away, my youthful helper. He called to me, "You wouldn't let me in, so I pulled your bung." The bung was replaced, the barrel refilled, the youth cordially invited to view the performance, to get him out of harm's way, and the show resumed.

Another evening when we were unloading our materials from the motorboat, the trunk bearing the film slipped off the landing into the water. We hastily recovered the film, but not before it had received a good soaking. At the hotel, we decided to dry the film by stringing it in long strips about the room. The plan looked good, and we soon had our task completed, after which we turned in to bed.

About 2 A.M. I was suddenly awakened by my partner shaking me roughly by the shoulder. "What's up," I asked. "Why," he replied, "there's a terrible thunder storm going on, and if this film ever is ignited by the lightning, the whole place will go up." I endeavored to quiet his fears and get him to return to bed. But he remained unmoved by all my arguments, and he finally ended up by stalking downstairs, there to spend the balance of the night keeping the clerk company.

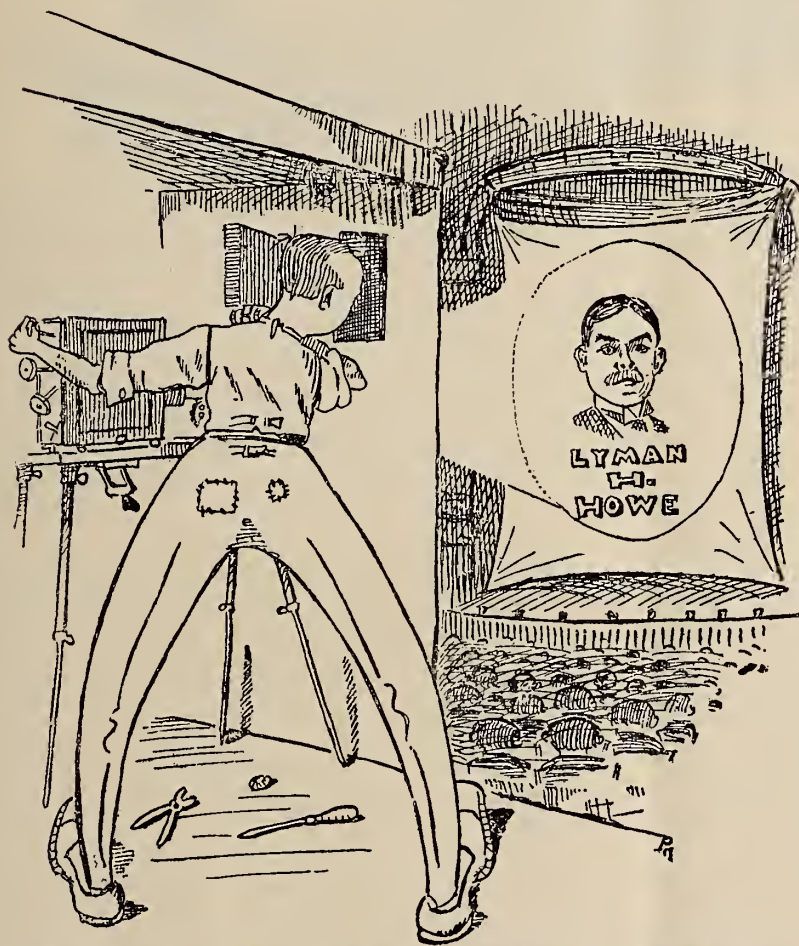
Our summer in the Thousand Islands was very profitable, but the next season saw many store shows there and we didn't return.

After our summer trip, I went back to the Vitagraph Company to await such assignments as might come my way. I found that many machines had been installed during my absence, but this rather made the projectionist's job harder than easier.

Practically every operator of a show had his own preference in equipment, and a projectionist was likely to find any one of five or more makes of machines in use in the house to which he was assigned. The machines then most popular were the Edison, the Powers, the Motiograph and the Simplex, and a projectionist was expected to know how to operate all of them, and, what is more, to operate them well.

FROM A NEWSPAPER CARTOON TWENTY-FIVE YEARS AGO.

MAX HOLLANDER "ON THE JOB"

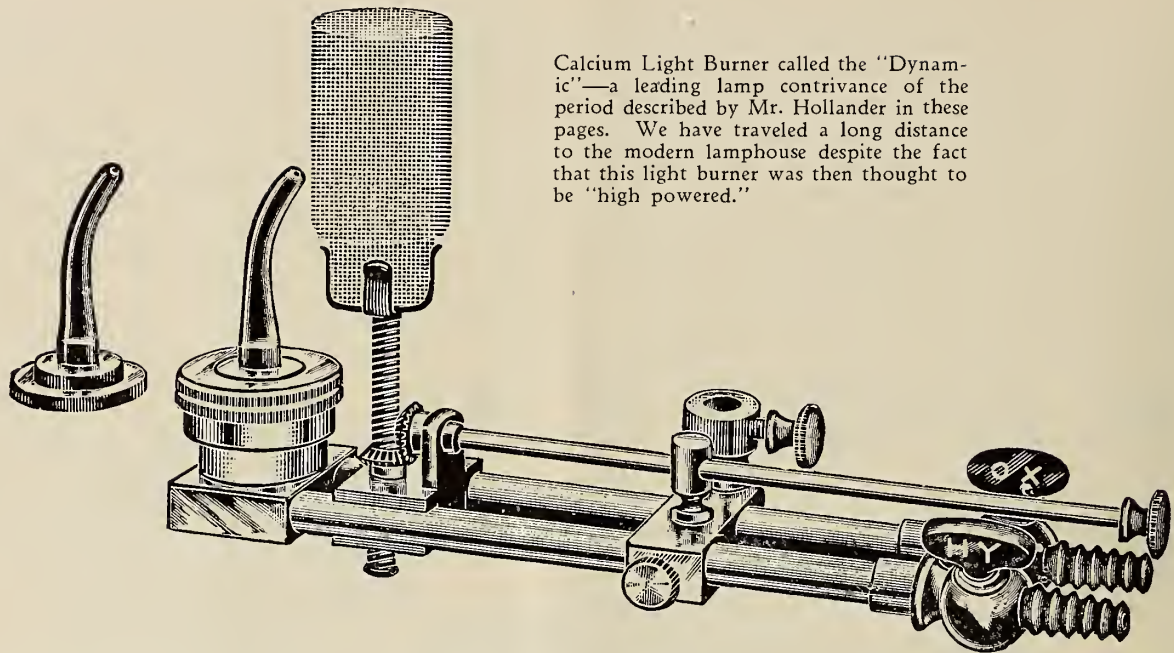


THE MAN WHO MAKES HOWE'S PICTURES PERFECT AT THE NIXON.

Since Lyman H. Howe opened his engagement at the Nixon theater many stories have been written in regard to the people who help make his pictures real. Many stories have been written about the people behind the screen. Even the musical director has had his bit of newspaper mention. While all this has been going on there has been one man who has been forgotten. He is "the man on the box," otherwise Mr. Howe's operator, and people seem to forget that the success of the entire entertainment rests upon this man's shoulders. It is known the world over that Mr. Howe presents the largest and clearest moving picture ever produced on canvas. Max Hollander, who has been in Mr. Howe's employ for several years, is the man who is responsible for the perfection of the Howe pictures. In order to make a moving picture beautiful a master hand must be at the projector. The tinting must be effective and artistic and each picture has

a certain course of speed in order to make the picture perfect.

The machine used by Mr. Howe is one of the largest and strongest ever used in the moving picture business and is one of the most complicated. The mechanism of the machine alone contains one hundred parts, many of these being patented by Mr. Howe, who besides being a globe trotter is an inventor of some note. The reels of the Howe machine are 20 inches in diameter and contain 2,000 feet of film. There are 20 pictures to each foot and each reel contains 40,000 perfect pictures. While Mr. Hollander is now Mr. Howe's operator, he is also a moving picture photographer of some note, having gone abroad with Mr. Howe last summer on his vacation, and while in India he secured some of Mr. Howe's best subjects of that far away land. Mr. Hollander is also a kodak fiend and has a wonderful collection of snapshots taken in all quarters of the globe.



Calcium Light Burner called the "Dynamic"—a leading lamp contrivance of the period described by Mr. Hollander in these pages. We have traveled a long distance to the modern lamphouse despite the fact that this light burner was then thought to be "high powered."

About this time Lyman H. Howe, the noted explorer and lecturer, was touring the country with his troupe. Howe was using still pictures to illustrate his lectures, but immediately following the development of the motion picture, he decided that slides would no longer do. He requested Vitagraph to furnish him with projection equipment and to assign him a projectionist. The assignment fell to me.

Howe's itinerary called for one-day stands, one show a day, unless the size of a town warranted both matinee and evening exhibitions. The troupe made the jumps from one town to another in autos, while the equipment and baggage was carried in a truck.

One of the towns on Howe's schedule was Painted Post, a short distance from Olean, N. Y. Painted Post had no electricity, so it was necessary to dispatch an auto to Olean for tanks of hydrogen and oxygen to contrive a make-shift power source. When the messenger returned from Olean a leak was discovered in the oxygen tank. Examination of the tank showed that there was enough gas to run only 6,000 feet of film, whereas the complete show ran to 10,000 feet.

Our manager was very angry over the incident, as business up to this point had been very bad, and he had intended to recoup some of our losses at the performance that evening, which, incidentally, was a benefit affair for the town fire department.

After thinking over the situation for a while, the house manager, who was also the town fire chief, told us to start the show, run as much film as was possible and leave the rest to him. I had visions of an enraged audience charging at me when the last bit of gas had been used.

The house filled rapidly, the larger part of the audience being made up of the volunteer fireman and their friends and we started the show on schedule time. The show reached the point where I knew the gas must be giving out, and when I expected momentarily to have to leave my machine and run. Suddenly from the street there sounded the clamor of the fire bell. The volunteer firemen, (most of the audience), heard the alarm and dashed

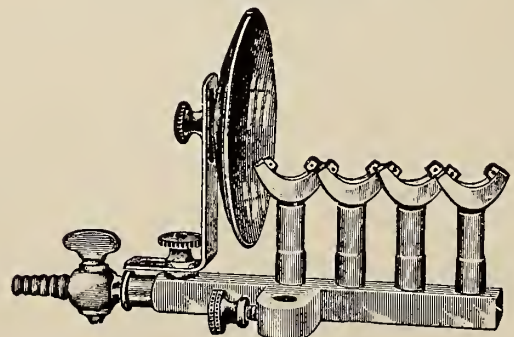
from the house; and they were followed by many others anxious to see the fire. The house was almost completely deserted. Quickly we stopped the show, packed our equipment and moved out of town, leaving behind a message of thanks for the house manager.

Arriving in Batavia, N. Y., for a show, I found that only alternating current, 25 cycles, was available. In the Opera House itself there was no current; but directly across the street was a hotel where they generated their own. To secure current to run the show, I ran an overhead cable across the street into the hotel.

Another incident occurred while I was with Howe which still is very fresh in my memory. The show was booked to play on successive days in two small North Carolina towns, about 100 miles apart. In the second town, Goldsboro, we were scheduled to give a matinee at the Opera House. Business was only fair, and our manager was particularly anxious to make the matinee performance at Goldsboro because this town had netted him a good profit previously. So he ordered the troupe to take to the road immediately following the evening show.

The weather was bitterly cold, and as the trip was made by auto, we suffered much from cold and fatigue. After a weary, all-night ride we arrived on the outskirts of Goldsboro at about 9 A.M. As we neared the town one of our party discovered a cloud of smoke rising over

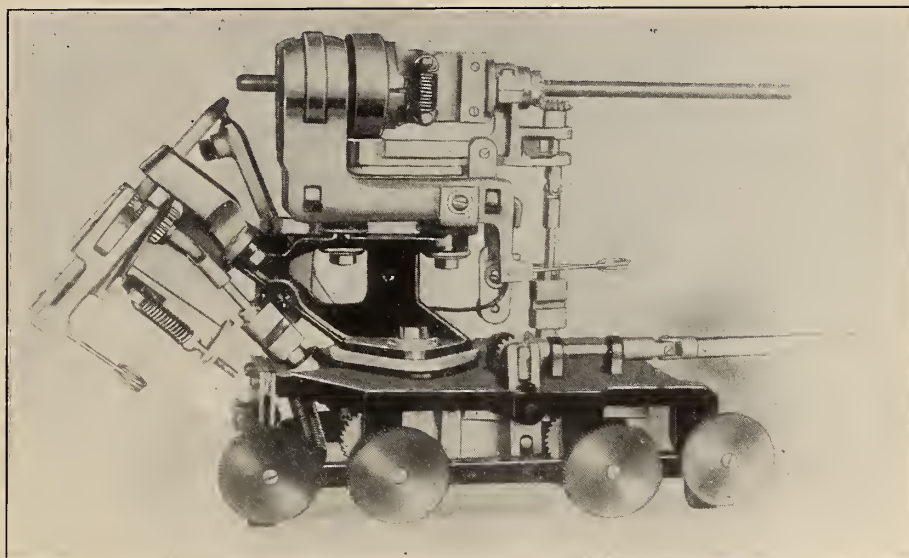
(Continued on page 40)



ACETYLENE GAS BURNER, ANOTHER LAMP USED IN THE OLD DAYS.

The New Hall and Connolly H. I. Lamp

by
THEODORE HALL



MECHANISM OF THE NEW H. & C. HIGH INTENSITY REFLECTOR LAMP.

Following is a lecture delivered by Mr. Theodore Hall of the firm of Hall and Connolly on their new High Intensity Mirror Reflector Lamp before the Manhattan Projection Society at Loew's American Theatre, New York City on September 20, 1927. Through the columns of The Motion Picture Projectionist, The Manhattan Projection Society wishes to extend its thanks to Lester Isaacs, Supervisor of Projection for Loew Theatres, Inc., and to Morton O'Brien, his chief aid, for the courtesy of the theatre and also to Charles Moskowitz of the Loew organization for his permission. Five hundred Projectionists attended the lecture and all received the lamp with favor.

ABOUT a year ago HALL & CONNOLLY, Inc., commenced to build a High Intensity Reflector Lamp along the lines of their present one. At that time many things indicated that the time had come for making a radical change in projection illuminants in order to secure more brightness, a more even light, greater efficiency, and more convenience of operation.

At first various schemes of arc feeding and positioning were tried. A great many different kinds of reflectors were made until they finally arrived at what they now consider the "happy medium" for all around general results, the type H. I. R. (*High Intensity Reflector*) Lamp.

The H. I. R. lamp is not a modification of the low intensity reflector outfit. Such a modified lamp was tried and it was found that in this method of burning the carbons real high intensity results could not be obtained and besides the arc was unmanageable, a condition very detrimental to good projection.

In the H. I. R. Lamp a real High Intensity Burner is used. It is the result of years of experience in building the high current projection lamps.

The following are the high points in the description of the H. I. R. Lamp:

1. A large reflector of such focal length as to prevent breakage and excessive fitting. It is large enough in diameter to collect the greatest amount of light and still keep the physical dimensions of the complete outfit within practical limits.

2. A reflector mounted so as to be a separate unit, not part of the lamp. It is mounted in its holder on spring

cushions and asbestos rings. Should the reflector by accident be broken the mounting rings will retain the pieces in place and thus prevent any interference with the proper projection of the picture.

3. The reflector unit is mounted as a door on the back end of the lamp house. It is accurately lined up so that its horizontal axis coincides with that of the projection lens and always remains in this correct fixed position. To adjust the spot on the aperture the lamp burner is moved backward, forward, right, left, up and down.

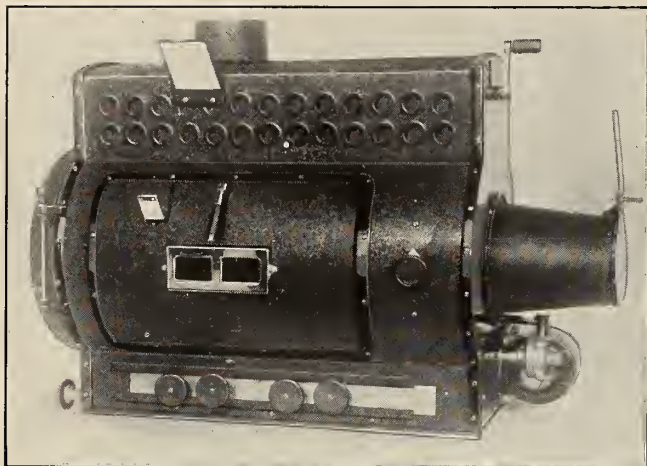
4. The mirror (12" in diameter) and its mounting are hinged on the lamphouse, allowing it to be swung open for cleaning, inspection and access to the burner mechanism. A convenient latch locks it in place.

5. The lamphouse is large and roomy for proper ventilation, and access to the mechanism. Its outline, though determined largely by the shape of the large reflector is pleasing to the eye, and appears neat and compact when mounted on the various projection machines. It has a large door on each side. The doors are hinged down and held closed by means of a convenient latch and handle. All control and hand feeding handles are located on the outside of the lamphouse, and on the side most convenient for the projectionist. A very simple and practical arc image projector is located on the side of the lamphouse throwing a clear cut picture of the arc on to a card. This enables the operator to see how the arc is behaving without looking in through the colored glass windows. He may also mark the proper position of the arc on the card and regulate the feeding accordingly.

6. The lamphouse is provided with an inside protective douser which prevents the reflector from becoming fouled when starting the arc. A change over douser is conveniently located on the front end of the lamphouse cone. A motor control fuse and terminal box with hinged cover is provided. All wiring is in flexible metal conduit and is of the totally enclosed type and is located on the outside of the lamp house, in front.

7. The finish is black crystal heat-resisting enamel on all sheet metal parts, black smooth enamel on castings, and bright polished nickel on handles, etc.

8. The burner is of the true High Intensity design. Both positive and negative carbons are fed between geared rollers through substantial and adequate wiping



SIDE VIEW OF THE H. & C. HIGH INTENSITY LAMP.

contacts. The contacts are designed for a 50% overload, continuous service. The positive carbon is slowly rotated as it is being fed forward. The speed of the feed of the positive carbon is controlled by the speed of the lamp feed motor, and the motor speed is in turn governed by the position of the positive crater in relation to the tip of the negative carbon. The initial speed of the motor for any given current value or grade of carbon can be adjusted by a knob and indicator located on the outside of the lamphouse.

The feeding of the negative carbon is entirely independent of that of the positive, but the speed of the positive feed depends on the position of the negative. The negative is fed up into a certain fixed position at all times, regardless of the speed of the motor, and the positive adjusting itself accordingly makes the lamp practically self focusing as well as self feeding to arc length.

The negative is fed up into position by means of a pilot tip located near the arc and this causes a relay to operate the feeding mechanism as the carbon burns away. In this way uniform feeding is secured and consequently the light is even on the screen at all times.

9. This lamp has been designed so as to meet any emergency that may occur on any arc lamp in the Projection room. If the automatics should for any reason become inoperative the lamp can very easily be operated by means of the independent feed knobs. If these should also fail entirely the lamp can still be kept burning to continue the picture without a stop. These emergency features have been incorporated at the suggestion of various projectionists.

The outstanding features of the lamp are:

- Extremely high efficiency.
- Reliability under all conditions.
- Low cost of upkeep.
- Convenience of operating.

EFFICIENCY

Gives real high intensity projection at 35 to 70 Amperes. At 60 amperes the screen brightness is considerably greater than that obtained from the ordinary high intensity lamps at 120 amperes.

The evenness of illumination on the screen is a great deal better than that obtained with the older high intensity lamps. Edges and center of screen are always equally bright and clean cut. Definition of the picture is excellent. Absolutely no out-of-focus effect as experienced with certain types of light sources.

RELIABILITY

It is constructed to withstand rough usage. It is designed by men who are experts in their line and who have had many years of experience in supplying reliable lamps for

motion picture work, both in studios and theatres. Is backed up by our service and guarantee.

CONVENIENCE

It is easy to get at to clean, lubricate, and re-trim. All feed and control handles are located on the right hand side of the lamphouse.

When the lamp has been trimmed it can be run continuously until both carbons have been consumed. Can be run continuously for more than an hour and a quarter without re-trim and without hand feeding or hand adjustment.

For replacement of parts the lamp can be taken completely apart and re-assembled in a few minutes.

LOW COST OF UPKEEP

Free from the constant replacement of condensers as is the case with the older types of lamps. It is our opinion that reflectors will last at least one year without becoming too much pitted.

Less replacement of parts than on the large high intensity lamps due to the lower current used and less expensive parts.

BOOTH, Mr. Hall and Mr. Connolly were formerly employed as engineers at the Sperry Gyroscope Co. of Brooklyn. They were engaged in development work on High Intensity Arc Lamps for Army and Navy Searchlights.

Some time in the year 1918 they developed and built a High Intensity Arc Lamp for motion picture projection at the Sperry Works. It was a rather complicated mechanism, being fully automatic self striking, self feeding, and even self focusing. It worked very well and gave good screen results, but it was found that it was not sturdy enough and too "automatic" for the steady grind in the average booth. It is supposed that this was the first attempt at High Intensity Projection.

About a year later another simplified model was made. It was much sturdier but not so automatic. It had, however, better means for aperture spot adjustment and was more convenient to re-trim.

All Sperry High Intensity Searchlight lamps were air cooled by means of high pressure blowers. This air blast cooling was employed in the earlier models of the Projection Lamp. Later on this was found to be unnecessary and was discontinued.

The Sperry Co., not desiring to enter the motion picture field, licensed another company under the High Intensity Patents. This new company proceeded to make and market the Sperry High Intensity Projection Lamp. It was then known as the Sunlight Arc Lamp. This name is familiar to many Projectionists. A number of installations were made in some of the larger houses. Screen results were good but the functioning of the lamp was only fair. The company discontinued the marketing of the lamp after a while.

The men who, as Sperry engineers, had developed this new lamp now formed the *Hall & Connolly Co.*, re-designed the lamp entirely, making it simpler, and sturdier, incorporating many valuable suggestions made by Projectionists. At last a reliable outfit for High Intensity Projection was available.

At about the same time that the first H. I. Projection lamp experiments were under way, Mr. Hall and Mr. Connolly, while still with the Sperry Co., were working on a scheme of projecting stereo lantern slides on clouds. In this experiment the light source employed was a 75 ampere High Intensity Searchlight Lamp.

The light was collected and projected through the slide by means of a 24" glass reflector. This is believed to be the first High Intensity Reflector Projection Lamp ever used for picture work. It was said at that time that this type of a lamp, with a smaller reflector, might be used for movie projection, but it was thought that a reflector lamp for projection was too radical a departure to be introduced in connection with a new source of light, the high intensity arc.

Sources of Light*

By P. R. BASSETT

THE purpose of this paper is to treat the subject of light sources in motion picture work from the physical point of view. A number of interesting and useful papers on light sources based on other considerations are contained in our Transactions, and an attempt will be made not to repeat data that has been covered in these previous papers. In this discussion the physical causes of light production rather than the sources of energy or types of apparatus will be used as a basis. There are a number of ways in which matter may be agitated so that it will produce light. The agitation or disturbance may be obtained by a variety of means; the flow of electric current, chemical action, such as combustion, etc. The different types of light production are principally as follows: fluorescence, phosphorescence, luminescence, solid incandescence, and flame incandescence.

In motion picture work, fluorescence and phosphorescence play no part because of their low brilliancy. The only instance that I know of fluorescence being utilized in motion picture studios was the early attempts at correcting the color value of mercury vapor arcs by painting the reflectors with rhodamine, which fluoresced with a red glow, the color which is missing in the mercury vapor light. Fluorescence is the light given off by certain materials when a shorter wave-length falls on them. The short wave-length is absorbed by the material and re-emitted as a longer wave-length, but the brilliancy is always comparatively low. In motion picture work there are two requisites for light sources—actinic for the studios and brilliancy for projection. It is possible only by the last three methods of light projection to produce a brilliancy or actinic suitable for motion picture work. In the studios the very first sources of light used depended on luminescence. The mercury vapor arc and the white flame arc were the two original light sources and both are luminescent sources. Luminescence is always produced by gas or vapor into which sufficient energy is introduced to tear apart or ionize the molecules and atoms. This action is accompanied by light and when the energy concentration is great, the light from such a source can be very bright and very actinic. Since ionization is the cause of this luminescence, the spectrum is not continuous but is distinctive of the elements or materials which are energized. Therefore, by proper selection of materials, actinic lights or lights of various colors may be produced. Mercury vapor is in common use for two reasons; first, because of its actinic and, secondly, because of the ease of vaporizing it and forming an electric arc in the vapor.

In the white flame arc, cerium and other rare earths are chosen because their spectrum is not only actinic but has so many lines scattered through the visible spectrum that it gives a clear white or blue-white appearance.

These light sources are still the main sources of studio equipment, but strange to say no matter how much energy is concentrated in a luminescent source, it has not yet been possible to bring it up to sufficient brilliancy to be useful as a source of light for projection.

The actual intrinsic brilliancy of a mercury vapor arc is only from 0.01 to 0.1 c.p. per sq. mm. The brilliancy of the carbon arc flame is from 0.01 to 0.1 c.p. per sq. mm., and of the white flame arc from 1 to about 6 c.p. per sq. mm., so when we turn to the projection end, we leave the luminescent sources and utilize the light produced by solid incandescence, the tungsten filament of an incandescent lamp or the hot carbon crater of an electric arc. Compare the intrinsic brilliancy of these sources with the figures mentioned for the luminescent sources. A gas-filled incandescent lamp runs in brilliancy from 10 to 30 c.p. per sq. mm., the crater of the carbon arc runs from 100 to 200 c.p. per sq. mm. Solid incandescence, such as produced by these sources, is temperature radiation from the solid material caused by the agitation of the molecules of the material jostling each other but not breaking down or ionizing as in the case of luminescence. Therefore, the spectrum of the incandescent sources is continuous, having all wave-lengths and is not characteristic of the material but is characteristic of the temperature to which the material is heated. When a solid body is heated, it radiates this heat. As the temperature increases, the radiation increases as the fourth power of the temperature and the maximum wave-length of the radiations shifts from a point in the extreme infra-red toward the shorter wave-lengths. As the wave-length of the radiation shifts toward the shorter waves and gets down to the visible spectrum, first appear the red radiations or longer wave-lengths of the visible spectrum. An object heated up to this temperature is called red-hot. As the temperature increases, the radiations increase in intensity and the maximum shifts further toward shorter wave-lengths. We therefore pass through the stages of yellow-heat to white-heat. Ordinarily when we say a thing is white-hot, we consider that such a temperature is the maximum obtainable but this is not so. The only reason that it has been considered so is that by the time the temperature is raised to white-heat, all materials either melt or vaporize and it is, therefore, impossible to find anything which can be raised to a higher temperature and still give solid incandescence. Instead, they vaporize and fall back to giving luminescence and, therefore, much lower brilliancy even though the temperature is still high or higher. But, in considering the high-intensity arc, we can actually demonstrate an incandescent source of light which is actually at a temperature hotter than white-hot and which could be called blue-white heat.

* From the Transactions of the S.M.P.E. with permission.

We are now all familiar with the high-intensity arc. It has become well established, both in the studio and in the projection field. It holds a unique position in each field in that it has not so much displaced or crowded out other units as it has made possible the extension of accomplishments and improvement of results in both fields. For instance, in the studio, it has been in a large measure responsible for the new technique of large sets, one of the outstanding achievements of the American motion picture. In the theatres it has made possible the typical modern de luxe motion picture house of a seating capacity from 3000 to 5000, and gives projection in these large houses which is more satisfactory even than in many of the smaller houses.

It must be admitted that for many years we used and talked about high-intensity arcs without having a complete understanding what the source of light was. All the early literature on these arcs refers to a ball of gas or vapor in the crater. Further study of this arc, however, has disclosed a remarkable story and one which fits into the scheme of light production, which we are considering in a very surprising way. The secret of the extremely high brilliancy of the high-intensity arc is neither luminescence nor solid incandescence. It is flame incandescence.

The history of the development of light sources is written entirely around flame incandescence up to within the last hundred years. The original pine knot with its red and smoky flame, which our ancestors carried as their only source of light, was flame incandescence. The candle, the rush-light, the oil lamp, and the acetylene lamps, such as used on the early automobiles, are the progressive steps in the improvement of flame incandescent sources, and each step is an increase in the temperature and, therefore, the brightness of the flame. The incandescence of all of these flames is due to the fact that they contain very minute, what might be called colloidal particles of free carbon, which are produced by the chemical action of combustion and which are heated up by this action to a temperature so that they glow. These particles are not as small as molecules and, therefore, they do not ionize but actually give out temperature radiation of the same quality as a carbon rod or filament would give out at the same temperature. These colloidal flame particles are usually burned with the oxygen of the air by the time they reach the top of the flame and pass off as a gas, carbon dioxide. Hence, we are not ordinarily aware of the fact that they are solid material. The smoky or sooty flame, however, is the give-away. Since, when the carbon supply is too great or the air supply too small for complete combustion, these flame particles cool off as they pass out of the flame without being burned and appear as ordinary soot or lamp black.

The first intimation that the high-intensity arc was peculiar and not like other arcs, as had been taken for granted, was due to the occasional occurrence of soot

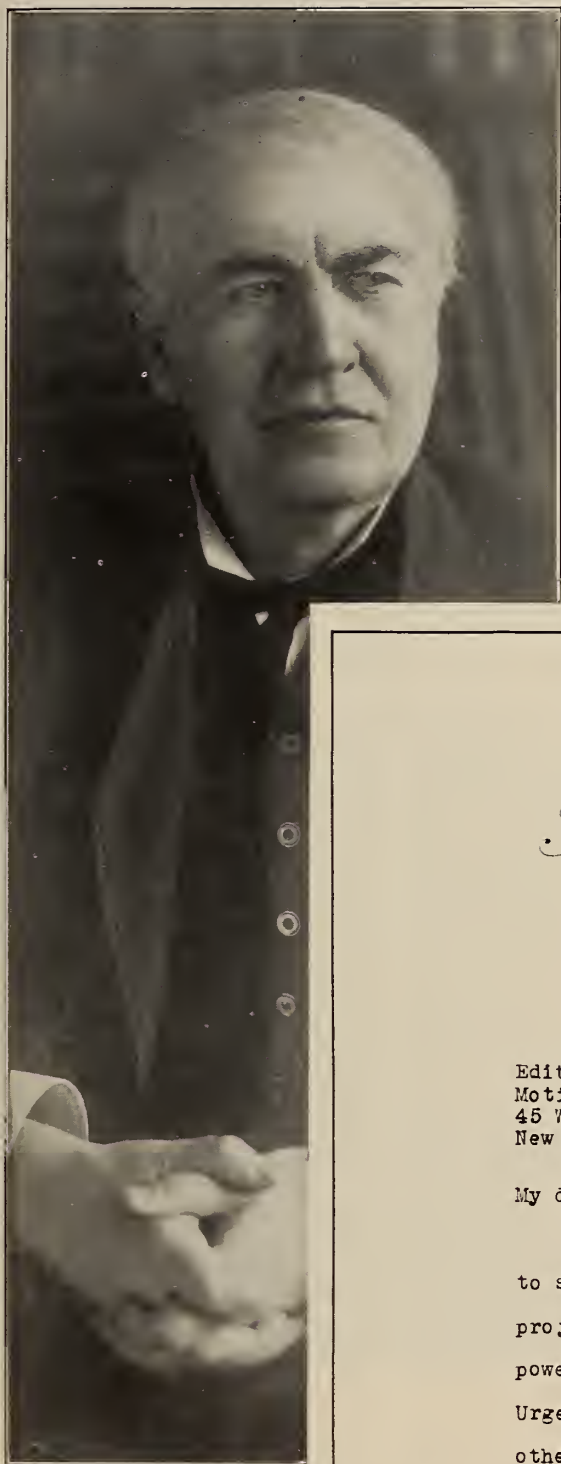
from the flame coming from the positive crater. This soot can be produced very densely by overloading the carbons or by causing the crater flame to push out sideways into the cold air, so that it is cooled so rapidly that combustion is not complete. Upon collecting this soot and examining it and testing its qualities, it is found to bear a strong resemblance to ordinary lamp black. We might call this new product the "electric lamp black," as it is the first known method of actually producing lamp black from an electric arc. The ordinary carbon arc will not soot, it will hiss and carry on in all other ways but it cannot be made to produce an incandescent flame, and, therefore, cannot be made to soot. The actual cause of the incandescent flame in the high-intensity arc, therefore, cannot be laid alone to carbon. It is due to a chemical reaction between the carbon and the cerium salt with which the core is impregnated. This chemical reaction takes place at a very high temperature right at the bottom of the crater. The carbon and the cerium unite to form carbide.

Cerium carbide is a rare but not unknown compound which has a boiling point so high that it has never been actually determined experimentally, but has been estimated at about 4800°C. This is some 600 or 700 degrees higher in temperature than it is possible to heat carbon, because carbon volatilizes at 4100°. We, therefore, have the solution of the secret of the high-intensity arc. The flame consists of colloidal particles of cerium carbide heated up to a temperature 600 to 700 degrees hotter than carbon can possibly be heated, and making an incandescent flame quite similar in its properties to the ordinary incandescent flames of burning organic material.

It is extremely interesting in looking at the progress of illumination to notice how for thousands of years the only class of illumination used was the flame incandescence which progressed through the centuries from the pine knot to the acetylene automobile headlight. Then with the coming of electricity, flame incandescence was entirely deserted. Progress switched to solid incandescence with the coming of Edison's carbon filament lamp, and the tungsten lamp; in the gas field the Welsbach mantle supplanted the fish-tail flame, the street arc lights gave most of their light from the solid incandescence of the craters of the hot electrodes. Electricity also brought luminescent sources. The flame arcs, the old yellow flamers that used to hang in front of the first motion picture theaters, the mercury vapor arcs, the Moore tube which had a short-lived popularity, and now the Claud Neon tube, are all luminescent sources. Flame incandescence was actually deserted. Now, however, through the high-intensity arc, electricity and the incandescent flame have joined hands and produced a unique illuminant, the most brilliant yet known and a very important member of the motion picture family which has played its share in the progress of the industry during the last six years.

ONCE UPON A TIME

Mr. Max Hollander whose reminiscences of twenty-five years ago are published in this issue recalls many other queer events and picture "habits" which were not included in his article. He tells for instances of the custom of having customers check their cigars in the lobby before they were permitted to enter the theatre proper, a convenience that flourished when the picture industry was very young, when cigars may have cost less but were better than they are today and when frequent break-downs of film or projection machine gave male customers the opportunity of enjoying a few puffs in the lobby to cool their impatience. Each customer was given a numbered check to identify his cigar, but Mr. Hollander recalls one theatre on his itinerary which had two very conniving fans. They would check their cigars as they went in but quarreled with each other violently during the intermission because they accused each other of having appropriated the other's (the better) cigar butt. To quiet them, the manager always bought them fresh ones. This act never failed.



A Message to Projectionists

from
"THE WIZARD"

*From the Laboratory
of
Thomas A. Edison,
Orange, N.J.*

September 19, 1927.

Editor
Motion Picture Projectionist,
45 West 45th Street,
New York City.

My dear Sir:

I am happy to accept your invitation to send a message to the men who run the projecting machines. In their hands is the power to make or mar the pictures they receive. Urge them to respect the accomplishments of others if they would have their own work appreciated. I extend to them and to your new publication my best wishes.

Very truly yours,

Thomas A. Edison.

TAE:O

Talking Movies

by

JAMES R.
CAMERON



TO make a picture on the screen realistic, something more is necessary than the visual effect alone. To see persons in the act of talking, without hearing what is said, or to see waves dashing on rocks, or lions seemingly roaring away, without hearing anything other than the faint buzz of the projector, leaves an impression of something lacking.

From the earliest days of motion pictures this want has been felt, and it is now rarely that a motion picture exhibition is given, even in the smallest of country halls, without a musical accompaniment of some sort.

A suitable and appropriate selection of piano music greatly improves any picture exhibition; and, on the other hand, an inappropriate selection, or a poor rendering of a good selection is worse than no music at all.

An ordinary piano is all that is used in many places, but even a piano, organ, orchestra or orchestra substitute, however excellent the instrument or combined instruments may be, has limitations: and while these can be adopted to give music that will harmonize to a large extent with most pictures, there are many sounds and noises, musical



Dr. Hoxie, inventor of the General Electric System, showing the sound recording element with the film cartridge exposed.

and otherwise, which require special devices for imitation, such as, for example, the roar of traffic, the buzz of motors, pistol shots, sea waves, etc., etc. Invention and ingenuity have not failed to supply means for imitating these in a very realistic manner, but it requires a considerable amount of skill and practice to utilize such means to the best advantage.

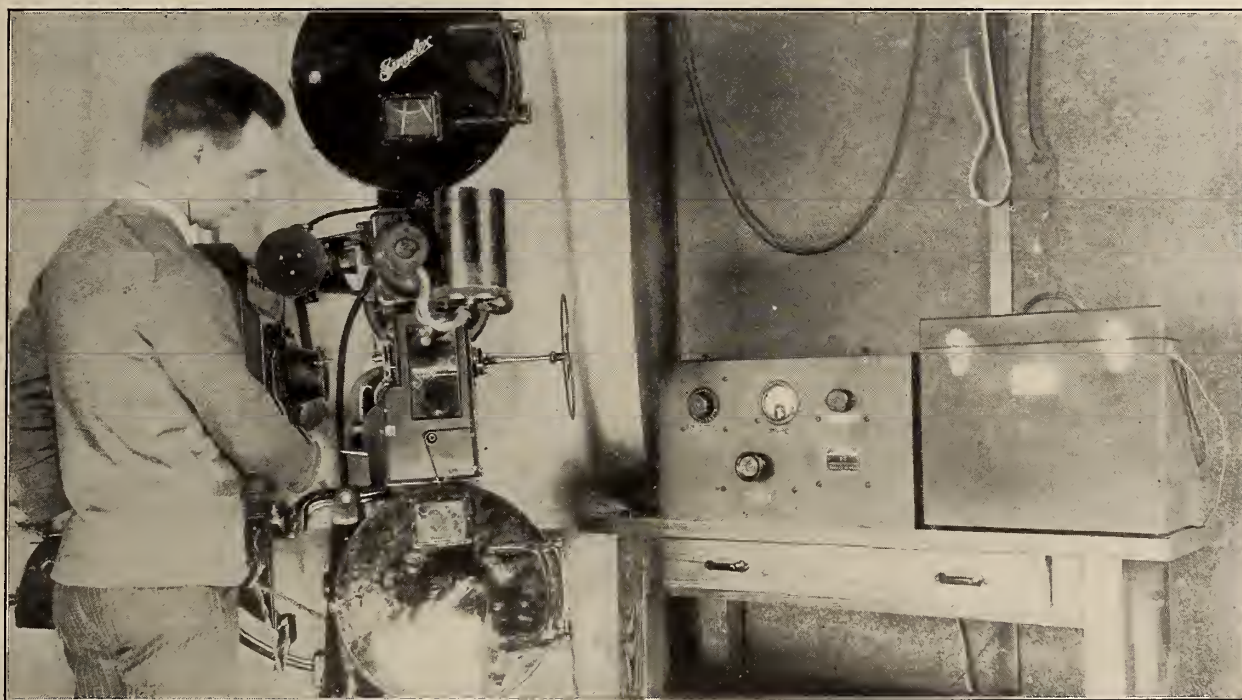
The production of actual sounds, as well as the picture, was attempted in the early days of the movie, and was used by Demeny for his Photophone, and by Edison for his Phonokinetograph and Kinetophone. The production of imitation sounds or effects is quite a different problem compared with the reproduction of the sounds themselves. In the latter case the sound record has to be made and reproduced with the picture. It must, moreover, keep in time with the picture: that is to say, there must be "synchronism" between the sound and the pic-

ture records. The ordinary victrola record is obtained by the action of a vibrating membrane which produces a series of indentations in a soft surface of wax. These indentations are used to reproduce the vibrations of a membrane, and thereby reproduce the original sounds. Stripped of all mechanical refinements, this is the essential principle of the victrola. If, then, a record of the sound can be made simultaneously with the photographic record, it would not at first thought appear to be difficult to reproduce them synchronously.

The first of these problems is rendered difficult by reason of the limitations of the sensitiveness of the recording instrument. This instrument must be within a certain range of the sounds (and for a speaker or actor the range is not a large one) and it is difficult to get the instrument near enough and still keep it outside the camera lines. Accordingly, another method has been resorted to, which is applicable in a large number of cases. The

essary to automatically indicate to the projectionist if the synchronism is being maintained, or some means by which the running of the projector or victrola, or both, is automatically adjusted to maintain synchronism.

In one of the earliest methods, introduced in 1902 (Gaumont's) a motor was used to drive the projector. This motor was electrically controlled from the victrola. The victrola drives a shaft, carrying collector rings of an electric circuit, and carrying also rotating brushes, which rub on a divided collector, the sections of which are connected to the stator of the motor. The next advance was the use of the synchronized motors for driving both the victrola and the projector. Mester, in Germany, about this time appears to have been working along the same lines, and special types of motors were used. Two motors of identical design and of the same power were driven from the same current supply, and, in order to better maintain synchronism, the motor armatures each



SHOWING THE GENERAL ELECTRIC SYSTEM ATTACHED TO A STANDARD PROJECTOR.

music record is taken first, and the picture film is produced to the accompaniment of the record. To succeed with this method it is obviously essential that the speaking, singing or acting, should synchronize with the sound record for synchronism between the same return and the picture film to be possible.

A further limitation arises from the size of the record obtainable. A small or short record means a short film. The size and length of an ordinary record is very limited, and for a speech, sketch or piece of any material length, several lengths are necessary, and these would need to follow on at the proper time and in the proper order.

Having obtained the record and picture film, the problem of reproducing them synchronously is still a formidable one. It is, of course, theoretically possible for the projectionist to keep his eye on the screen and his ear on the victrola record, and to control the speed of the projector or the victrola so as to maintain synchronism. This, however, throws an additional burden and responsibility on the projectionist, and is not a practical method. Accordingly, either an auxiliary device is nec-

had a number of sections which were connected in pairs. A switchboard near the projector included a starting switch, whereby the victrola was first set in motion; and when the record commenced, it operated a switch to start the projector. A voltmeter on the switchboard indicated any want of synchronism, which defect was corrected by accelerating or retarding the projector. This was effected by coupling the projector with its driving motor through a differential gearing, which was operated from a separate motor. This latter motor was started by an auxiliary two-way switch, so that the differential could be used to retard or accelerate the speed of the projector to restore synchronism.

The talking movie in use to-day may be divided into two classes. One, where the sound or voice is recorded onto a wax record and reproduced by using a victrola and an amplifying device and run in synchronism with the projector, by driving both the projector and the victrola off the same motor, which method, it will be seen, is practically the same as that used some twenty-five years ago by Gaumont and Mester. The other method

is where the voice or sound is photographed directly onto the margin of the motion picture film.

In the latter classification we have the Fox-Case *Movietone*, De Forest's *Phonofilm*, and the General Electric's *Pallophotophone*. While each of these systems have a lot in common, each varies a little in actual operation. Let us in this article deal with the system perfected by Dr. Hoxie and which is shortly to be placed on the market by the General Electric Co.

One of the demonstrations of this instrument included the use of music as an accompaniment to feature films, the music being rendered by a full concert orchestra. Development of this field requires no change in the technique of making the original film. After the original film has been made and titled, the accompanying music is played by a concert orchestra and is recorded on a film. The picture and the sound records are then printed on one film in the proper time relation. To the layman this would seem a rather difficult thing to accomplish, whereas the process really is a simple one. At the time of this writing the Fox-Case Corp., working in conjunction with Mr. S. L. Rothafel (Roxy), are presenting at the Roxy theater in New York City the first feature picture ("Seventh Heaven") in which the accompanying music is photographed onto the film and reproduced by means of the *Movietone*. Another type of demonstration has been the showing of singers and instrumentalists while they are presenting programs.

To the casual observer the talking film does not differ from the usual motion picture positive. It is of standard width, but along the left margin there is a strip a small fraction of an inch wide on which is a series of horizontal light and dark bands and lines of varying widths and intensities. It is this series of bands and lines which causes the sound to be produced. The film is passed through a reproducer at constant speed, and as these light and dark bands pass rapidly before a tiny slit in an optical system, the amount of light is varied. The ever changing amount of light is received by a photoelectric cell, the electric eye, which is extremely sensitive to any change in the amount of light striking it. The more light received, the more current it will permit to pass through its circuit. This current is amplified and changed from electrical to audible energy by an amplifier and a speaker.

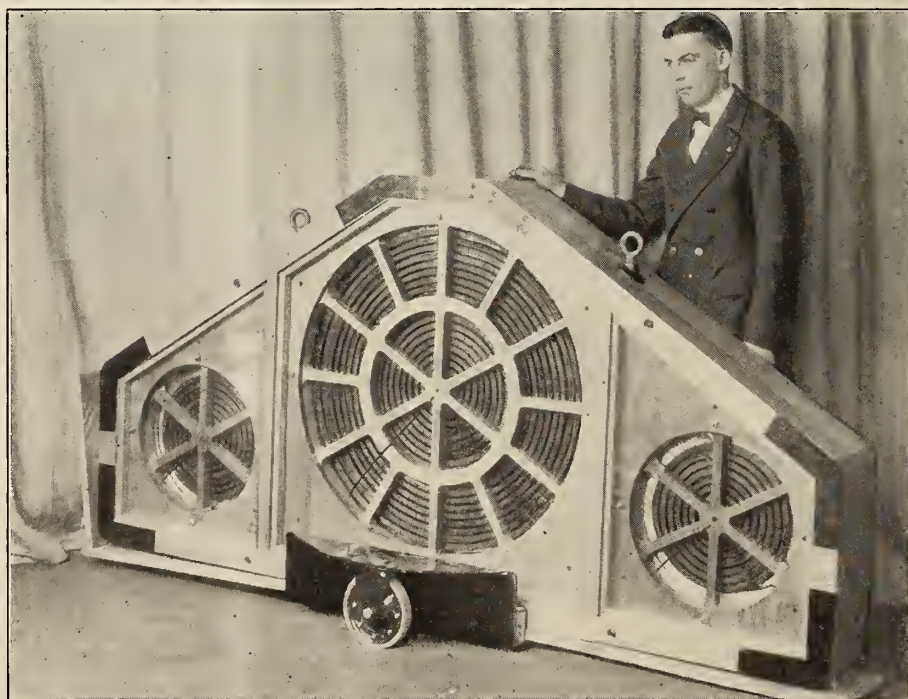
Both the picture and the sound records are on the same standard motion picture film, and a standard motion picture projector, with an attachment for the sound reproducer, is used. Since the picture and the sound records are printed side by side on the film, it necessarily follows that the two must be properly timed or synchronized at all times; but as it is impossible for the picture to break and the sound to continue, or for the sound to stop and the picture to continue, no difficulty is expected to develop.

There are three principal elements in the apparatus: a standard motion picture camera, a sound recorder, and a standard motion picture projector with a sound reproducer, all driven by synchronous motors.

In recording the sounds, a microphone or sound collector of any desired type is employed, together with amplifiers. The microphonic system actuates a tiny vibrating mirror which records the sound on the film as light and dark bands, the light from a small incandescent lamp being reflected by the mirror through a tiny slot in the optical system in front of the film. The higher the pitch of the note, the higher its frequency and the greater the frequency of vibrations of the mirror which faithfully reproduces each sound vibration as a mark on the film.

The sound-reproducing attachment which is connected to the standard motion picture projector consists of a photoelectric cell behind the film and a small electric lamp with suitable optical arrangement in front of the film. As the film passes a small slit, similar to the one used in making the sound record, a varying amount of light is admitted to the photoelectric cell, the amount of light depending on the photographic density on the sound track. The result is that a very minute and varying current, an exact replica of the sound wave, is produced. This tiny current is amplified and led to a loud speaker which reproduces the sound in sufficient volume to fill the auditorium.

Educationally, there are also many ways in which the new apparatus will be of service. Many schools and colleges are already equipped with motion picture projectors as an aid in the class-room work, and this new sound-film will be found of even more assistance. In the case of professors from abroad, it will be possible to record their lectures and demonstrations simultaneously, and to give their lectures the widest possible circulation by distribution of the film to colleges and universities throughout the country. Similarly, it will be possible to have an authority on any subject give a description to accompany any educational film for use in the schools, the speech pointing out the important features of the picture simultaneously with their appearance on the screen. These are a few of the possible fields in which the new talking motion pictures will find applications. The list can, and will be, expanded.



THE LOUD SPEAKER USED IN THE GENERAL ELECTRIC SYSTEM OF TALKING MOVIES.

A Message to Projectionists



from

LESTER B. ISAAC

Supervisor of Projection, Loew Theatres, Inc.
and Associate Editor



To my mind the most significant event of the day as regards the Projection Craft is the publication of the Motion Picture Projectionist. Aside from the fact that it promises

to be a gold mine of valuable information worth its weight in gold to any Projectionist who wants to advance himself in his work, it stands for me as a symbol of the power and the importance which our craft has now attained. When a craft rates its own national publication, it has "arrived."

Thousands of Projectionists felt the need of a national publication. Now that the Motion Picture Projectionist has come out I hope Projectionists everywhere will cooperate to make it the great success it deserves to be.

(Signed) LESTER B. ISAAC.



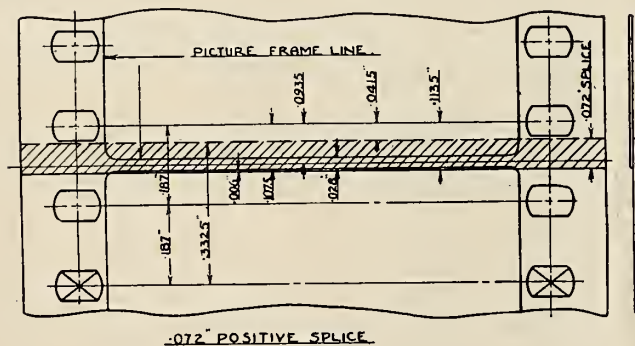
Correct Splicing

and

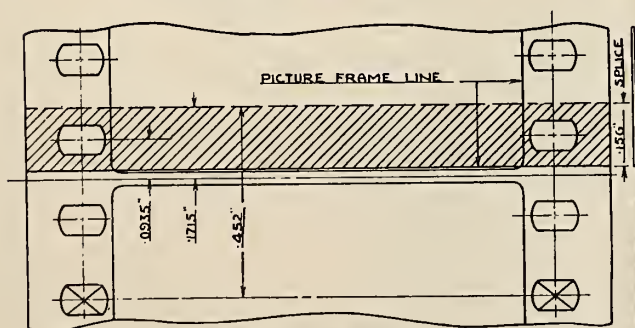
HOW NOT TO SPLICE*

By EARL J. DENISON

DURING the past ten years the mechanical processes involved in the making of motion pictures have, for the most part, been subject to critical analyses followed by changes and improvements which have resulted in increased efficiency. Processes of major importance, such as the perforation of the film, the taking of the pictures, and the making of positive prints, are now carried on by means of standardized machines and instruments, the use of which insures surpassingly fine artistic effects and a minimum of production cost. But some minor processes are of major importance, and these have received scant attention. The splicing of film is a case in point. This process has, until recently, been carried on by crude methods which have produced unsatisfactory results. A faulty splice may throw the picture out of frame, trespass upon the picture space, stiffen the film at the point of the splice, or give way altogether. And to the extent that it does any of these things, it makes impossible the production of the perfect motion picture.



.072" POSITIVE SPLICE



.156" FULL HOLE SPLICE

A more intimate knowledge of motion picture film, the abuses it is subjected to in the theatres, together with the reasons for proper inspection, splicing, and handling,

will lead those engaged in this particular branch of the industry to an understanding and appreciation of the necessity for perfect work.

Of primary importance among the mechanical processes is that of film perforation, because accuracy in this operation is the first requisite in the making of quality pictures; that is, since it is the initial operation, successful handling of the succeeding processes is only possible with the utmost accuracy in film perforation. The fact that the life of the film depends almost entirely on the physical and mechanical condition of the perforations (sprocket holes) proves that the utmost care should be exercised to prevent the perforations from becoming damaged.

The matter of splices has never been confined to any one locality but constitutes a problem for all laboratories, exchanges, and theatres.

This problem presents features more complicated than the mere holding quality of the splice, and the recurrence of complaints shows clearly that a satisfactory means of splicing film to withstand the use to which the prints are subjected in the theatres has yet to be standardized.

There is very little difference in the strength of the different types of positive splices, but there is considerable difference in uniformity, flatness, register, etc. It is an easy matter to obtain strength, but strength alone does not constitute a satisfactory splice.

Projection is the ultimate test for the mechanical and physical qualities of the splice, as well as the film. All tests are made with 10 foot loops of film. While practically all film damage occurs in the theatres, about 50 per cent of the damage is traceable to improperly made splices for which there are six primary causes.

Cause No. 1. *Splice out of register* (sprocket holes not perfectly matched). Splices of this kind will jump while passing through the projector and probably damage the film.

Cause No. 2. *Splice too wide*. A splice is stiff and unbending, and if too wide will not seat properly on the sprocket wheels of the projector, causing a jump with probable damage.

Cause No. 3. *Improperly scraped splices*: Due to the fact that film cement only acts upon the celluloid base of the film, it is necessary to entirely remove the emulsion in making the splice. Where there is a particle of emulsion, the cement will not hold, causing the splice to open and come apart.

* From the Transactions of the S.M.P.E. with permission.

Cause No. 4. *Too much or too strong a cement:* We say "splicing" the film, when it is more nearly correct to say "welding" the film. The cement attacks the celluloid base of the film, and when the pressure is quickly applied, the two pieces of film are welded together. When too much or too strong a cement is used, the whole celluloid base is softened instead of only the surface, causing the film to cup or buckle after drying.



Fig. 1.—Several good examples of mis-matched splices. Note how perforations fail to register.



Fig. 2.—Examples of exceedingly wide splices and mis-matched and poorly scraped splices.

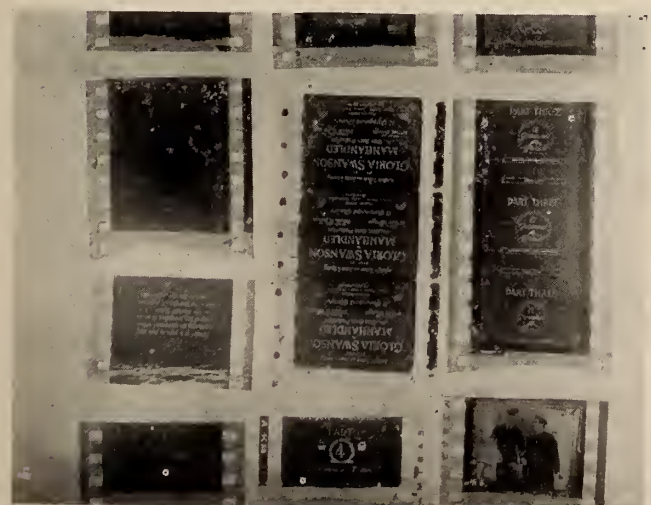


Fig. 3.—Showing poor attempt at scraping and disregard for correct cutting and alignment.

Cause No. 5. *Not enough cement or cement in bad condition:* If too little cement is used, it will not soften the celluloid sufficiently to make the splice hold. Film cement evaporates rapidly if left uncorked and will cause the mixture to lose its proper proportions. Cement in this condition will not hold the splice.

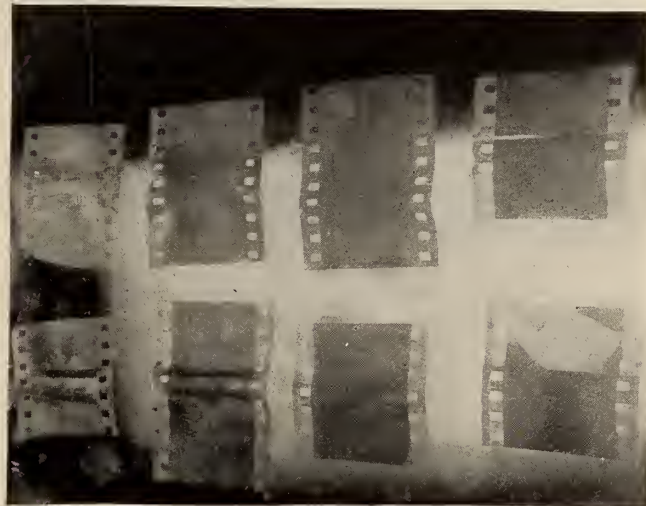


Fig. 4.—Cupped and buckled splices the result of using too much or too strong a cement, excessive scraping of base or both. This kind of splice invariably causes damage.

Cause No. 6. *Uneven scraping:* It is necessary to remove every particle of emulsion to make a good splice, (See Cause No. 3). However, great care must be taken not to thin down the celluloid base for the reason stated in Cause No. 4.

Improper tools, careless handling of the film, or dirty hands will also result in poor splices. Covered hands or taped fingers will not permit the best work.

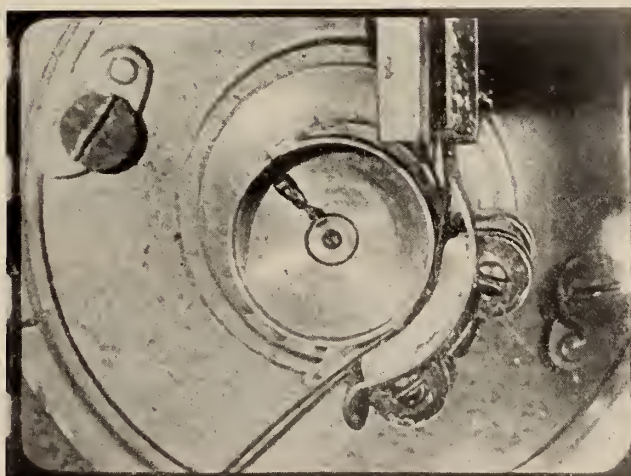


Fig. 5.—A wide splice at rest on the intermittent sprocket. Note how it fails to seat properly.

So far, this paper has dealt with hand-made splices. Now, let us examine some of the results of improperly made splices. The fact that every film passes through two or three different makes of projectors, and that each of the three most widely used machines threads differently from the others, does not make any difference whether the splice is lapped left or right.

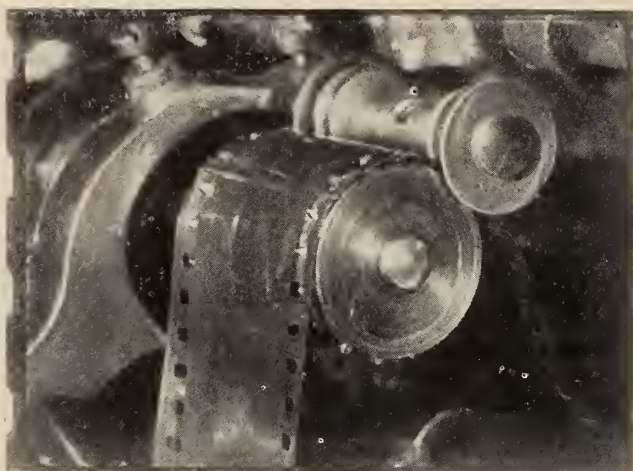


Fig. 6.—An excessively wide splice just starting to run off the take-up sprocket.

Certain tests show conclusively that the film invariably runs off at the take up sprocket, and ninety-nine times out of a hundred the run-off is caused by a bad splice. The reason for this is that the film at the top sprocket is kept taut by the tension on the reel in the top magazine, and the film is kept taut at the intermittent by the tension at the aperture. The film feeds on to the bottom sprocket out of a loop that is constantly slapping back and forth, and a slight imperfection in a splice will cause the film to run off and become damaged. The condition of the film after running off the sprocket is shown in Figs. 7 and 8.



Figs. 7 and 8.—Showing Sprocket Runs.—This form of damage is very common. It generally starts at a bad splice and invariably happens at the take-up sprocket.

Very few projection rooms are properly equipped to splice film, but fairly good splices can be made by hand if sufficient time and pains are taken. However, most splices made in the theatres are made in a hurry, and the samples used in the accompanying cuts are fair examples of how film is spliced in the average theatre.

Not only has a great deal of damage resulted from improperly made splices, but oft times the presentation of a picture is greatly marred. A bad splice also constitutes a fire hazard.

Exhaustive experiments and research have proven conclusively that the best splices cannot be made by hand. In order to prepare a good splice the following conditions must be fulfilled:

First: The splice must be narrow enough in width to conform to the periphery of the sprocket wheels.

Second: The film must be uniformly scraped.

Third: The perforations must be in perfect register.

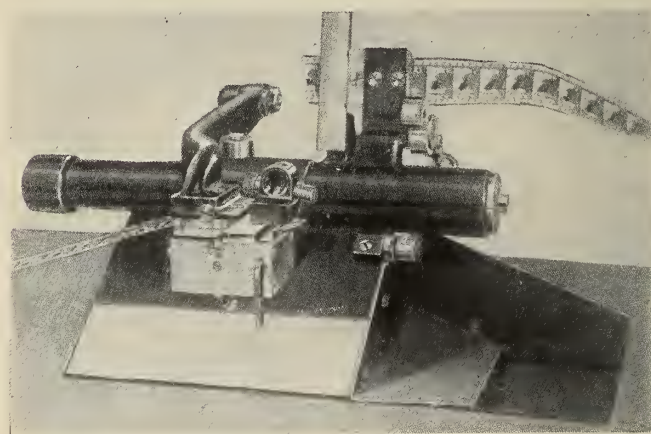


Fig. 9.—Splicing mechanism of Automatic Splicing Machine.

Fourth: The cement must be quickly and evenly applied.

Fifth: Uniform pressure must be quickly applied after cementing.

The answer to this is, to splice film properly, splicing must be done automatically.

The Famous Players-Lasky Corporation have equipped all of their exchanges and laboratories with the Bell and Howell automatic positive splicing machine. This machine automatically cuts and scrapes film and applies even pressure to the splice. The plates on which the splices are made are heated to about 120°F. The heat not only acts as a binder to the cement but makes it quick drying.

It certainly is the duty of exchanges to properly inspect and splice the film served to the theatres. It is also the duty of the projectionist to make as good splices as possible, and a little more thought and pains on the part of the projectionist in making splices will greatly add to the life of the film and react in better service from the exchanges.

All film and splices used in these illustrations were taken from prints in daily use in theatres throughout the United States. All illustrations of film in projectors are enlargements made from slow motion pictures of projectors in actual operation.

Proper Location and Construction of Projection Room

By DAVE NARCEY

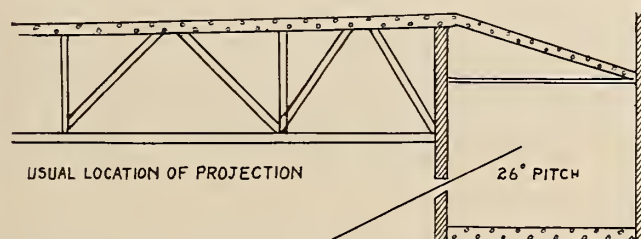
THE proper location and construction of the projection room deserves the greatest consideration from builders of motion picture theatres. The projection room is obviously the most essential part of the theatre and therefore architects and building engineers should treat it as a first consideration. Although the attitude toward the projection room has changed favorably in the last several years it wasn't so long ago when it was held to be only a necessary evil. It was then—and very often now—placed at the top of the highest balcony or secreted in a false ceiling and suspended by trusses from the roof. As many theatres have two balconies the projection room was therefore four or five floors above the street level and between 150 to 200 feet away from the screen. In placing it at such an elevation and distance from the screen the necessary angle of projection was apparently forgotten.

The angle of projection, or degree of inclination as it is sometimes termed, is of the greatest importance when the pitch is, for example, 26 degrees. In this case, when the picture reaches the screen it is distorted and causes what is commonly known as a keystone. This defect can sometimes be remedied by tilting the screen to a certain angle or filing the aperture plate in the mechanism. But the picture will always be distorted.

In the construction of a new theatre care should be taken to minimize the pitch as much as possible. Large circuits which employ supervisors of projection now send the architect's plans to their projection chief and if the plans interfere in any way with proper projection they are sent back to the architect with the supervisor's corrections and the plans redrawn accordingly.

Another vital problem often sidestepped by architects and builders is the size of the projection room. Why limit the space to an old ruling setting aside a certain number of square feet per machine? The modern pro-

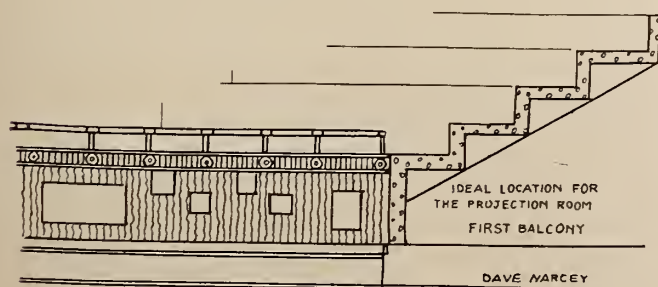
jection room usually has three projectors, two spotlights and at least one combined effect and stereoptican projector. This means that it is necessary to allot between 24 and 30 feet width and about 15 feet depth to house this equipment comfortably. In stipulating 15 feet depth consideration is given to the installation of additional or special apparatus, such as panels and switchboards as is used with talking machines. It at least allows the Projectionist to operate his equipment freely; visit the average projection room and you find it very cramped.



It seems most advisable, in building the projection room, to use the entire width of the theatre, subdividing it into the required rooms, making provision for the following: Projection Equipment, Rewinding and Examining of Film, Generator and Exhaust Fans, Battery Charging, Storage, Wardrobe, Showers and Toilet and Experimental Workshop.

Provision should also be made under each machine for Pull Boxes to provide for additional wiring whenever necessary. These boxes may be connected with each other by a two-inch pipe terminating in one large master pull-box.

The use of the bellows ought also to be eliminated in up-to-date projection rooms. To blow away the particles of dirt that lodge in the aperture plate there should be installed a one-eighth inch pipe line in the front wall of the projection room, the line connected to an air tank automatically controlled by a motor and installed in the generator room. Outlets to the side of each projector can be provided by connecting lengths of rubber hose long enough to reach around the projector. At the end of each hose attach a hand releasing nozzle. In using this appliance the projectionist can clean any part of his projector by compressed air.



THEN—AND NOW

Movie Theatres of Yesterday Cost Approximately (Complete Including Projection Equipment) \$10,526. The Following Estimate Was Prepared by Lester B. Isaac, Supervisor of Projection for Loew Theatres, Inc., Who Counts Eighteen Years Experience as a Projectionist.

1 Projector complete with projection and stereopticon lenses, rheostat, rewinder and a few reels for the sum of \$125.00.

200 Chairs at from two to four dollars each.

1 Gal. of Kalsomine to cover the wall for a screen for about 75 cents, a roll of tickets and a roller for 50 cents, a store front that had a suitable show window for a booth, which in those days could be purchased for about \$10,000, depending on what zone the property was in. The whole amounting to about \$10,526.

Today, Mr. Isaac Estimates That Modern, Up-to-date Theatres Spend Nearly \$14,000 to Equip the Projection Room Alone. Under His Supervision All Projection Rooms in Loew Theatres Contain the Equipment Listed Below at a Cost of Exactly \$13,189.

- 2 Motor generators, 150-300 Ampere capacity.
- 3 Latest type special improved projectors with latest type high intensity lamps.
- 2 Effect and stereopticon projectors.
- 2 Latest type special spotlamps.
- 1 Special high intensity spot lamp.
- 3 Sets speed indicators with extra meter.
- 3 Latest type projection lenses.
- 500 Sets high intensity carbons.
- 250 Sets spot lamp carbons.
- 200 Sets stereo carbons.
- 3 Special take up devices.
- 7 Electric changeover devices with foot switches.
- 1 15-reel 2000-foot size approved film cabinet.
- 3 Special pedestal titling devices.
- 2 Special carbon cabinets.
- 6 Special rheostats for spot and stereos, in addition to projector rheostats.
- 12 15" special reels.
- 6 10" special reels.
- 2 Metal Booth stools.
- 3 4½ x 6½ inch quartz condensers.
- 6 5 x 11 inch special heat resisting condensers.

Miscellaneous equipment such as film measuring machine, special splicer, film cement, oil, oil cans, arcsopes, drip pans, special motor belts, jaw cleaners, reelites, clothes lockers, etc.

Effect of Motion Pictures on the Eyes^{*}

By GUY A. HENRY

A FEW years ago a public official in addressing a national welfare organization made the following startling prophecy:

"Motion pictures will be extinct in ten years. The public realization that they are ruining eyesight will lead to a demand that they be abolished. Within ten years I predict that there will be no more motion picture shows in America. By that time they will be barred as a pernicious evil. They will be dropped by common consent for the common good as other useless things have been dropped in the past."

Had this prediction been made in the early days of the moving picture when poor photography and faulty projection with distressing flicker prevailed, there would have been some grounds for it; but such wonderful changes have taken place in the production of motion pictures and in their showing that in recent years there has been no just cause for serious apprehension as to motion pictures harming the eyes, providing attention is given to certain conditions.

Under favorable conditions moving pictures do not cause serious eye fatigue, but it must be borne in mind that several very important elements are necessary to make these "favorable conditions."

We will reverse the order in which attention is usually given to problems in industry and instead of first considering the mechanical factors we will consider the human element. Industry is inclined to develop the mechanical and neglect the man—to strive for mechanical perfection failing to consider the physical fitness of the individual. This fault in industry applies generally in regard to production problems.

In the subject now under consideration instead of the physical fitness of the wage earner it is the physical fitness of the customer, the individual in the audience, to which attention is directed.

Why is it with the great improvements in the production and exhibiting of motion pictures, so many complain that the movies hurt their eyes, and why is there prevalent the idea on the part of many that motion pictures are injurious to the eyes? This is a matter of concern to the industry — what is back of this complaint? Does the fault lie in the technique of production or mechanics of reproduction? No. We have accomplished wonders in the mechanical. Such remedy as is needed there is easy of accomplishment and lies in the simple correction of practices in the theater. To these I shall refer later. What, then, is the major cause for the complaint that the movies hurt the eyes? Let me tell you—if the viewing

of motion pictures such as are shown in the better class of moving picture theaters results in eye discomfort, headaches, or drowsiness the chances are that it is the eyes of the observer that are at fault rather than the moving pictures themselves.

Movies don't cause eye trouble but frequently do reveal the existence of eye defects.

Unfortunately, most of us have physical defects of vision—by this is meant that the eye itself is defective to an extent that causes vision to be less than normal or that the individual has good vision only through an extra exertion which causes eyestrain.

The great majority are unaware of impaired vision and do not know that theirs is less than the full measure of the most valued of the senses. Many others do not understand that a considerable degree of the vision they do enjoy is gained only through nerve exhausting eyestrain.

It must be borne in mind that viewing motion pictures is distance vision and the eye is being subjected to no greater burden than viewing distant objects under ordinary conditions, with this difference, of course, that there is the effort of constant and prolonged concentration in viewing motion pictures which does not obtain with the use of the eyes ordinarily in observing distant objects.

It is this element of concentration which causes motion pictures to act as a test of distance eye endurance and serves in many instances to indicate the presence of ocular defects.

In considering the possibility of eyestrain resulting from motion pictures, we must remember at all times that distance vision is involved—not near vision.

It is not the use of the eye for distance vision that is the cause of most of our eye troubles, but it is the demand of modern living conditions which puts such a greatly increased burden upon our eyes for near work. It is the innumerable adjustments required of the eye at close range under unnatural indoor life that aggravate the evil consequences of ocular defects, whereas looking at motion pictures is long range vision. Consequently, if the viewing of motion pictures under proper conditions results in eye discomfort, it is quite a sure indication that such a person has a defect of vision which is responsible for the eyestrain he experiences and he should attend to his eyes rather than condemn the movies.

If the eyes of the observer are normal for distance vision or corrected for refractive defects the owner should not experience discomfort in viewing motion pictures provided certain other conditions prevail.

^{*} From the Transactions of the S.M.P.E. with permission.

This brings us to the consideration of certain mechanical factors having to do with the effect of motion pictures on the eye which are namely:

1. The photographic quality of the film;
2. The projection of the film;
3. The screen from which the film is reflected;
4. General conditions in the auditorium.

With the remarkable advance in the moving picture industry and the improved methods of photography and of film manufacture, there has been attained a high standard of quality in this country in the production of motion picture films.

Worn films which produce streaks and spots of light or induce other objectionable defects of course should not be tolerated and I understand that practices adopted by the film exchanges have brought about a careful inspection of films which precludes the possibility of a worn or defective film being circulated for use in moving picture theaters. This is a precaution which the industry has wisely inaugurated. It is beneficial from every standpoint and is a practice which should be encouraged and its application widened to include the field outside of the motion picture theater.

Proper projection is an important factor in the elimination of eyestrain and eye discomforts and here again great improvements have been made in the mechanical field.

Flicker will result in eyestrain even for a normal eye because flicker affects the involuntary muscles, which control the action of the iris regulating the size of the pupil, and the effort of the iris to rapidly contract and dilate the pupil, in response to the stimulus of the rapidly varying light produced by the flicker, will quickly produce a condition of extreme fatigue. Flicker was formerly a most serious defect in motion picture projection, but development of projection mechanism has reduced this objectional feature to a minimum when the projection mechanism is kept in proper condition.

It, of course, is important that the machine be firmly mounted so that there will be no vibration to affect the smoothness of the reflection from the screen. Any unsteadiness or jerkiness will produce eyestrain as a result of the abnormal burden placed upon the extrinsic muscles of the eye in their effort to keep the eyes in alinement with uncertain and erratic movements of the pictures on the screen.

Occasionally a lateral movement of the picture on the screen is perceptible which the layman will attribute to fault in the projection, whereas it is due to unsteadiness of the camera in the original taking of the picture. Such defect is seldom noted in other than outdoor location where there is naturally more difficulty in gaining a firm placing of the taking apparatus than in the studio.

This lack of stability places a burden upon the muscles controlling the movement of the eye from side to side, but fortunately it is not common.

In no circumstances should an operator ever permit the light from the projecting apparatus to strike the bare screen. The sudden transition from the comparatively low illumination reflected from the screen as a result of the light passing through the film to the relatively bright light would be blinding in effect and decidedly harmful to the eyes of the spectators.

Eyestrain will be produced if the picture on the screen is out of focus. Involuntarily, the eye will try to compensate to make the picture more distinct—will try to

overcome the fogginess and clear up the indistinct view. This holds true especially with regard to captions.

There is involved here I believe an interesting bit of psychology. One will unconsciously try to compensate in some way, to overcome lack of definition in motion pictures, whereas, with a still picture which may be hazy one recognizes the fault as uncorrectable by personal effort and instinctively does not try to clear it up.

I have wondered at times if possibly the eyes of some of the operators who were focusing the machines were not defective and that this was responsible for lack of definition on the screen. Accurate vision is certainly required of the one who is responsible for deciding such an important matter.

In respect to the relative position of screen and seats certain conditions are important.

The observer should be at least 20 feet from the screen, because any distance less than 20 feet will bring into use the accommodation and convergence of the eyes imposing the conditions of near vision.

A joint committee on Eyestraining Moving Pictures appointed by the Illuminating Engineering Society of London, a few years ago, gave careful consideration to various conditions conducive to eyestrain and as a result of their study certain provisions were recommended regarding the relative position of the eyes of observer and the screen.

The angle of elevation in respect to the direct line of vision is important. The recommendation provides that seats should be so placed that to observe the top of the picture the eyes need not be raised more than 35 degrees from the direct horizontal line of vision. If the seats in the front row comply with this recommendation it is evident that all other seats in the auditorium will afford a satisfactory range of vision in the vertical plane.

Another important recommendation pertains to the lateral angle of vision, i.e., the angle to the side. The recommendation provides that at the far edge of the lateral angle of vision, i.e., the angle to the side. The angle formed by the screen and the line of vision should not be less than 25 degrees.

Certain general conditions in the auditorium are of decided importance and the outstanding need here is for attention to the general illumination of the room while the picture is being shown. Most theaters are darkened more than they need be with the result that there is set up a condition of undesirable contrast. The human eye does not function to its best advantage in the dark or in looking at a fairly well illuminated object when the eye itself is surrounded by darkness. There should prevail as high a degree of general illumination as may be consistent with securing clear and easy vision of the picture.

Too low illumination causes dilation of the pupil to an abnormal degree and provides a corneal area which does not permit of focal accuracy and which tends to distortion of outline. To partially overcome this there is induced segmental action of the ciliary muscle governing the focusing of the eye. Such muscular action can be attained only by great effort.

There is also strain of the iris muscles resulting from the prolonged dilation of the pupil, and another objection is that the varying intensity of the light reflected from the screen requires constant iris action more difficult of accomplishment than under normal dilation.

There is constant conflict between the extreme darkness surrounding the eye and the light reflected from the

screen. Under such a condition the eye is not only more susceptible to the natural varying intensity of the light from the screen, but the adaptability of the eye is lowered and the slightest flicker or movement is more noticeable and detrimental.

Extreme darkness is better for petting than perception. I am not advocating a degree of illumination that would detract from the romantic environment but rather an effect equalling starlight, a necessary element to make complete a midsummer night's dream or, better, a condition approaching that of moonlight, Cupid's one most effective allurements.

Neither may it be possible to afford sufficient illumination to enable one entering from the brightly lighted foyer to find a seat conveniently without first waiting until the eye adapts itself to the sudden transition.

It takes but a minute or two for the eye to become adjusted to the darkened theater and if one will wait he may avoid the embarrassment of trying to occupy a seat already completely filled by a large lady in a dark dress who has no desire to share the slightest part of it with an entire stranger.

The illumination of the auditorium should be gradually reduced from the rear to the front and all light sources so modified as to prevent glare, especially those which may fall within the spectator's range of vision. A faulty shade leaking a little light in the orchestra or over the organ will be a source of annoying glare, for even though the intensity of the reflected light from the screen may be much greater, the direct light by reason of the dark background will by contrast, be blinding in effect and harmful to the eye.

The decorative scheme of the auditorium naturally affects the general illumination. Gilt and silver even in subdued light may produce annoying reflections and, in some instances, these are responsible for an unfortunately low degree of lighting.

A flock of gilt or silver cupids floating around for decorative effect may produce annoying reflections when the lights are dimmed. Instead of reducing illumination to obscurity it would be better to invest them with a coat of dull bronze or to so cover them as to permit of a proper degree of general illumination.

All surfaces which might produce reflections should be guarded against, light brackets on walls and chandeliers should be dull finished.

At intermissions or changes in program when the general illumination is turned on, the current should be carefully gauged and the auditorium gradually brought from a state of semi-darkness to full light. A sudden or too rapid turning on of lights is not only irritating but decidedly harmful to the eye.

Investigations reveal that managers of picture theaters have no scientific way of determining whether or not the general illumination of the auditorium is what it should be and, in fact, this is governed by the judgment of the management which may take into consideration certain factors and entirely disregard others of equal or greater importance. A scientific study should be made of this problem and standards of illumination established for the guidance of the managers so that they may be sure that a matter so important as the general illumination of the theater during the showing of the picture is scientifically correct and that the eyes of their patrons are not being subjected to strain. In fact there should be developed a special code of illumination for motion picture auditoriums which will cover a field, which is too important to be left to the judgment of individuals.

Before leaving the subject of general conditions pertaining to the auditoriums I wish to mention one cause of headaches, no doubt frequently attributed to the eyes, which in no way has to do with light effects or eye defects. I refer to the ventilation—lack of proper ventilation will quickly produce discomfort, dullness, headache and other symptoms similar to those resulting from eyestrain.

The various conditions mentioned as important in relation to eye comfort are as easy of fulfillment in the cheaper theaters as in the better equipped. For the most part it calls for only a little thoughtful observation and attention to obvious details.

I have endeavored to present those things dealing with the effect of motion pictures on the eye and while specific references have been made to desirable practices in the motion picture theater that which has been said applies with equal force to another field in which you are concerned, namely, motion pictures in the so-called educational domain or non-theatrical.

Here, unfortunately, there does not obtain a helpful and beneficial control of films, attention to proper projection and other details. Films may be run until they become so worn as to show light streaks and spots which cannot help but cause eyestrain. Projection apparatus is not firmly mounted or becomes defective producing jerky motions of the picture and harmful flicker. Attention is not given to general conditions under which pictures are shown.

How to accomplish the much needed correction is difficult of solution, but it is a matter of concern to the industry and a responsibility of the industry to provide for proper supervision of the condition of films and projecting machines.

Possibly this may be best brought about through a control of distribution and an educational campaign which will acquaint those handling and showing films in the schools, colleges, churches and elsewhere, with the importance of observing proper precautions to avoid deleterious effect upon the eyes.

There is a great opportunity for your industry to further the cause of eye care not only by attending to those things in respect to the production and exhibiting of motion pictures which have to do with eyesight conservation, but there is also the great opportunity afforded through the medium of the screen to educate the public to the importance of eye care by visualizing, in the many ways which are possible through the moving picture, the story of conservation of vision.

In fact, it may be regarded as an obligation of the motion picture industry to actively participate in the educational campaign which is being conducted in the interest of the public.

As you serve so will you prosper. You contribute richly to the entertainment of the public through the eye and if with your great opportunity you employ that opportunity to present the sorely needed message of eye care, you will be serving the cause of humanity and enhancing the comfort and enjoyment of that which your industry offers to the public. You have the greatest medium in the history of man for visualizing to your enormous audience throughout the land a message of great human interest and of great benefit. It is your opportunity and your privilege to point the way not only to greater enjoyment of the entertainment which you offer, but to the greater enjoyment of life itself through better vision.

Film Mutilation

and

HOW TO PREVENT IT*

Prepared by the Eastman Kodak Company

EVERY year the loss through needless film mutilation runs into staggering sums and of course someone has to pay the bill. There are several contributing causes to this waste, as will be pointed out in the pages that follow, and it is with the frank purpose of giving projectionists helpful facts with which they may not be familiar that this paper was prepared.

Needless film mutilation may be caused by defective manufacture, faulty laboratory methods, poor inspection in the exchanges, careless handling in the projection room and worn or imperfectly adjusted projection machines, and, while it is difficult in many cases to fix the exact responsibility, each possible source of damage will be fully discussed.

The Film

The film can be blamed only when the manufacture is defective. The base or support of motion picture film, which is of standardized thickness, is made from cotton and with reasonable care will fulfill the requirements of commercial use, but due to the nature of its origin consideration should always be given to the fact that it has physical limitations. The Eastman Kodak Company with its years of experience in the manufacture of motion picture film (it was Eastman film that first made motion pictures possible) quite naturally observes every possible precaution to assure itself that the quality of its product is kept uniform. Samples from all coatings are thoroughly tested for their photographic and physical properties and must pass careful scrutiny of inspectors whose sole duty is to find flaws or imperfections.

The matter of accurate perforating is of the utmost importance and is only accomplished by constant vigilance on the part of experts to keep the machines at the highest degree of precision.

Recent changes in the perforation dimension of Eastman positive film was adopted only after exhaustive practical tests had proved its greater endurance and wearing properties.

As a final check against photographic quality and physical characteristics, test lengths are run through regular commercial projectors, under exactly the same conditions as would be encountered in the theaters.

The Laboratory

Improvements in equipment and methods of manipulation in all the important laboratories have reduced the

possibility of affecting the physical properties of the film during the printing, developing and finishing operations to an extent as to be almost negligible.

The Exchange

Investigation of the general procedure in the inspection and repair of prints indicates that a considerable proportion of the burden of print mutilation begins in the film exchanges. It is not so much that the exchange starts the damage as that it fails to stop it. Inspections are invariably too rapid to be thorough. Splicing is carelessly done with the result that the films are frequently sent to the theatres in such poor condition as to be unable to withstand ordinary projection, to say nothing of the super requirements, particularly with respect to high speed of projection and rapid rewinding, which are all too frequently the case. In rewinding, care should be taken to see that the "rewind" is properly lined up so that the film will feed from the one reel to the other without striking the edges of the reels. The use of defective reels causes untold damage in the rewinding operation. Cinching occurs when the person rewinding attempts to tighten the roll. This causes scratches on both sides of the film.

Cupping the film to detect damaged edges, perforations, or loose splices is very apt to crack or split the film, more especially on subjects which have had repeated projection on projectors using high amperage. Careful inspection and repairs in the exchanges will result in better service to the exhibitor, eliminate breaks which are the frequent cause of film damage, reduce the amount of replacements due to break-down, and make the subjects available for constant service. Longer commercial life means increased earning capacity.

The Exhibitor

Good projection adds patronage and increased revenue to the theatre.

Good projection is entirely dependent on the skill of the projectionist and the condition of the film and the projection machine. Through constant use projection machine parts become worn and out of adjustment. Projectors should never be permitted to get in this condition. Replacement parts are readily available and for the most part inexpensive, and any expenditure in this connection will improve projection and materially help in the reduction of unnecessary film loss.

Careful study of the following pages will be helpful to all concerned with motion picture film.

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Splices

Splicing, whether done in the film laboratories, film exchanges or projection rooms, has such direct bearing on the welfare of the film as to call for special and constant attention.

Much film is ruined by poor splicing. Splices that are wide, stiff, buckled and out of line cause the film to jump the sprockets resulting in torn perforations or breaks. Perforations in the vicinity of a splice of this kind will always be found to be strained or broken out. Stiff and buckled splices are caused by excessive scraping of the film, or a too liberal application of cement or both. The use of a poor quality cement results in splices pulling apart especially in the film gate or trap. This constitutes a hazard; therefore, all weak or otherwise bad splices should be remade before projection. FIGURE 1 shows the well known full-hole splice which is the most widely used and if properly made gives the best all-around results.

Pamphlets on splicing instructions may be had without charge on application to the Eastman Kodak Company, Rochester, N. Y.

Whenever film is damaged on a projector, it is generally customary to lay the cause of the trouble to one or more of three different things; namely, sprockets, idlers, and tension exerted on the film by the springs in the gate or film trap.

While it is true that in most cases the trouble can be traced to one or more of these points, it must be admitted that the direct cause of a great amount of film damage is never definitely settled between the film Exchanges and the Projectionists, especially when the projectors in question have been gone over quite carefully and everything has been found to be in apparently good condition.

In cases of this kind, it is only natural to assume that the film stock is at fault. There are, however, various projector parts, generally considered more or less unimportant which, as a rule, receive little or no attention on the part of the Projectionist. The result is that film trouble is apt to start at any one of them.

The following résumé covers the more important points which must be given careful attention by the Projectionists, if the maximum wearing qualities are to be obtained from the film.

Tension on Springs in Gate or Trap

One of the principal sources of trouble is the use of excessive tension exerted on the film by the springs in the gate or trap. A great variation will be found in tension on various projection machines being used in the trade. Moreover, there are some Projectionists who are not familiar with the amount of tension which should be used, and as far as we know, there is no set standard which is generally accepted as being correct.

It is common practice to set the springs just tight enough to hold the film stationary at the speed which is used in a given theatre. For proper screen reproduction the speed of a projector should be determined by the action of the picture. This is very seldom done, the average program being run at one set speed regardless of the

action. This cannot be considered the fault of the Projectionist as he is under a certain time limit to project a given number of reels.

Excessive tension as high as 34 ounces has been found to exist on certain projection machines and causes badly nicked and pulled out perforations. Heavy tension on one side can be caused by a poorly adjusted, weak or broken spring and results in an uneven pull-down strain on the film.

On projectors using the gate a stop or catch is provided which holds the gate in the same position each time it is closed.

Projectors using a trap door or pressure plate are not provided with a stop of any kind, thereby allowing varying amounts of tension to be applied to the film. The trap door or plate should never be let back against the film with great force as this results in exceptionally heavy tension, which must be withstood by the film until the door or plate has worked back to its proper position. The proper tension exerted by the springs should be 8 ounces for each spring or 16 ounces combined tension. Below FIGURE 2 is given the proper method of making a tension test.

Referring to illustration B: first the tension on one side and then on the other is taken by using one half of a strip of film about 8" long. This strip is prepared by slitting a piece of film down through the center. Care should be taken to observe that the perforations on this strip of film are free of the teeth on the intermittent sprocket and are held properly in place by the tension shoe before pro-

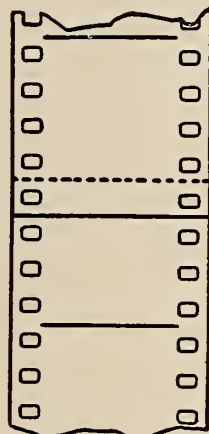


Fig. 1.
The Full Hole Splice
Generally Recommended.

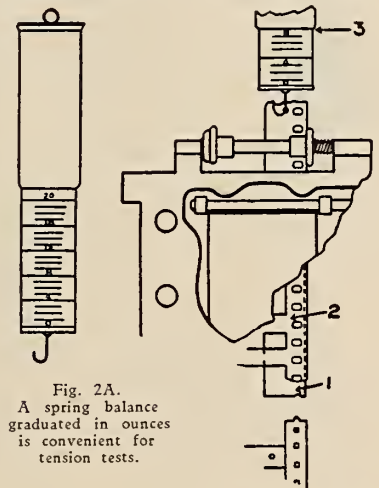


Fig. 2A.
A spring balance
graduated in ounces
is convenient for
tension tests.

Fig. 2B. Tension tests are made on each side. 1 is the film; 2 the pressure plate and 3 is the spring balance at 8 ounces.

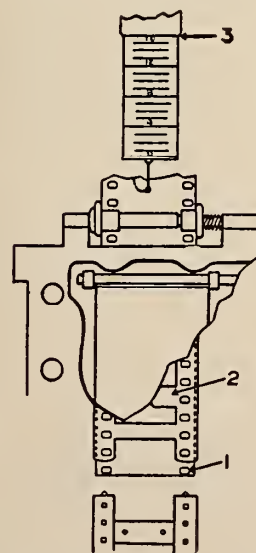


Fig. 3. A tension test is then made on both sides. 1 is the film; 2 the pressure plate and 3 the balance at 16 ounces.

ceeding further. After fastening the end of the strip of film to the balance a straight even upward pull is made until the 8 ounce mark is reached. At this point the film will start to pull from the gate if the spring is set properly.

The combined tension of both sides is then checked as shown in FIGURE 3, using a full width piece of film placed in the gate so that both sides of the shoe hold it firmly against the aperture plate. After making sure that the perforations on this strip of film are not engaged by the sprocket teeth proceed as before with a straight upward pull until the 16 ounce mark is reached. At this point if both springs are adjusted correctly the film can be pulled from the gate. To make this test

correctly, the projector should be cold, using film of the average thickness.

The tension spring on some projectors can be regulated by means of small set screws while on others no adjusting device has been provided and springs must be bent by hand, but in doing this great care must be taken to get the proper adjustment.



Fig. 4. Sprockets taken from projectors actually in daily use. Sprocket A is a new sprocket.

Sprockets

Through carelessness and neglect sprockets are frequently left on projectors until the teeth develop bad hooks and knife-like edges. Film damage caused by under-cut teeth is unmistakable in appearance and in many cases film is practically ruined after one or two showings if run on a projector equipped with such sprockets. (FIGURE 4)

The changing of an intermittent sprocket must be done with great care as the shaft can be bent very easily. Equipped with the proper tools any competent Projectionist can make the change but in many cases it may be advisable to have the work done at the factory to insure the best results.

Before placing new sprockets on projection machines, a careful examination should be made of the teeth to be sure that none of them have been damaged by coming in contact with one another or some other hard surface. If a sprocket is accidentally dropped on the floor the teeth are likely to be burred or bent and if used on a projection machine, will cause untold damage to film. This will be true even if only one tooth has been damaged.

Adhesion of Emulsion to Shoe or Film Tracks

All new film should be waxed to insure against adhesion or sticking in the gate or trap of the projector. When unwaxed film is run, it is necessary to clean the shoes frequently, otherwise the accumulation of hardened emulsion on the shoes acts as a hold-back causing a greatly increased pull-down strain which always results in mutilated perforations. Needless to say, a new print can be completely ruined in this manner at one showing.

In removing the hardened emulsion deposits from the film tracks and tension shoes use no steel or iron implement such as a screw driver, safety razor blade or file. Instead use a dampened cloth and if necessary a coin as this will not scratch the highly polished surface.

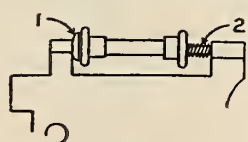


Fig. 5. This guide roller is not adjustable. Spring 2 is supposed to hold it snugly against the washer 1. If it is not properly aligned return the head to the manufacturer.

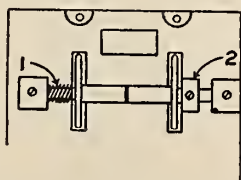


Fig. 6. This guide roller may be adjusted by loosening the set screw in collar 2 and then after centering tightening the screw. Great care should be taken not to "spring" the shaft.

Guide Rollers

The guide rollers located above the gate or film-trap are there for the purpose of properly guiding the film down past the aperture to the intermittent sprocket. If these rollers are out of line with the sprocket, the teeth will naturally strike the film perforations off-center.

On some projectors these rollers are adjustable by means of a collar and set-screw, while on others there is no regulating device. Certain manufacturers using the latter type, rely on the proper centering to be made at the factory, nevertheless there are times when an adjustment is found to be necessary and it is very important that great care should be used in lining up the guide rollers with the intermittent sprocket, otherwise damaged perforations will result. See FIGURES 5 and 6.

If these rollers bind, the face of the rollers will develop ridges which will roughen the edge of the film as shown in FIGURE 7. It is also well to examine new rollers closely as in some cases they are received from the factory in a semi-finished condition, and have rough faces against which the edge of the film comes in contact.

Friction Take-up

The take-up adjustment should be checked up closely from time to time. An excessive pull can always be detected by the film making a "singing" sound at the take-up sprocket. The sprocket, of course, acts as a hold-back or brake and puts a strain on the film, when starting on a small hubbed reel. This is sometimes enough to cause very severe damage to the upper side of the perforation. FIGURE 8 shows the sprocket damage resulting from a tight take-up.

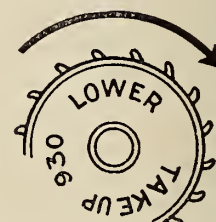


Fig. 8. The teeth of this sprocket have been undercut because the take-up was too tight.

Proper setting of the spring is a simple matter and care should always be taken to keep the friction disc, whether leather, cork or fiber, absolutely free from oil. Contrary to some opinions oil will not cause smoother operation in a case of this kind, but will really create a certain amount of suction which in turn results in an uneven, excessive pull.

Tension on Upper Magazine Shaft or Spindle

Some widely used makes of projectors have an adjustable spring tension on the upper magazine shaft or spindle. Proper adjustment of this spring is important. If set too loosely the film will come from the feed roll with a jerky motion. This is especially noticeable if used with a bent reel, which is bad for any film, particularly film which is in a dried-out condition or badly worn.

If the tension is too tight the effect would not be noticeable on a full reel of film, but the tension on the last 50 or 75 feet would be sufficient to cause serious perforation damage when a small hubbed reel is used. It is not uncommon for the film to break under this strain.

Sprocket Idlers

All sprocket idlers must be properly adjusted. If set too

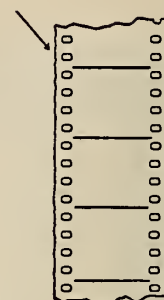


Fig. 7. The arrow shows where the film edge has been chewed away by bent reels or imperfect alignment of the upper magazine.

far from the sprockets, the film is liable to jump out of place and ride over the teeth, whereas, if they are set too close they will ride the film, causing creasing, especially on the lower sprocket which acts as a brake on the friction take-up.

The small lock nuts on all idler adjusting screws should always be kept tight. Failure to observe this rule will allow the idlers to drop, not only causing creasing but otherwise weakening and permanently marking the film.

It has been found that the safest distance to set an idler from a sprocket is the thickness of two pieces of film. Some manufacturers recommend the thickness of one piece of film but this is insufficient as the distance between the sprocket and idler is too small to allow the average splice free passage.

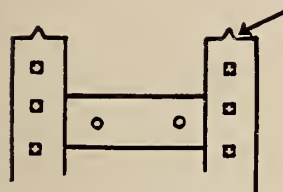


Fig. 9. The arrow shows where the teeth have been grooved to a knife-like sharpness by coming in contact with the wall of the film guide. This will ruin film.

When the idlers are properly adjusted, it should be possible to move any idler from side to side without danger of touching the sprocket teeth. Badly worn idlers mark the film and should be replaced immediately.

Intermittent Film Guide

The intermittent film guide, is for the purpose of holding the film snugly against the intermittent sprocket but otherwise has nothing to do with the steadiness of the picture. Filing the openings in the film guide holders is sometimes necessary to insure the proper amount of side clearance for the sprocket teeth. Moving the film guide from side to side while the projector is running will determine whether or not the teeth have sufficient clearance. FIGURE 9 shows the results of the wearing of the teeth against the wall of the guide, thereby developing sharp edges which cut into the film.

There is a right and a wrong way to install this film guide in the holder. FIGURE 10 shows proper installation—pointed end down. If in the reverse position as in FIGURE 11 the pointed end will present a shoulder to the film against which all splices must strike. This strain is so great as to cause torn perforations or even a break in the film

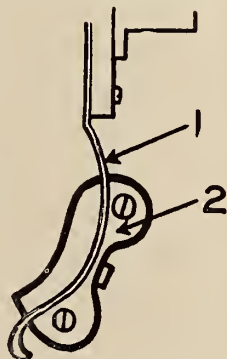


Fig. 10. This is the correct position for the film guide. Arrow 1 shows the guide holder and 2 is the film guide.

especially if the splices are stiff, thick or buckled.

Many Projectionists have found it advisable to substitute a slightly lighter film guide holder spring for the stiff one now furnished by the manufacturers. By this small change, less strain is put on the film at this point, with absolutely no change in screen results, wide and stiff splices, especially, going through with greatly decreased resistance thereby lessening the chance of film breakage due to the yielding of the film guide.

One of the main reasons for picture unsteadiness is an excessive amount of play between the moving parts of the intermittent movement, due to wear. Readjustment is made

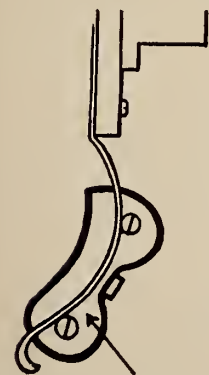


Fig. 11. Here the film guide is upside down, allowing the film to strike the sharp end of the guide. Stiff splices won't last under these conditions.

by means of an eccentric bearing but care must be taken to see that it is not set too tightly, otherwise the parts will bind.

Projector models using an eccentric bearing at each end of the intermittent shaft should be checked carefully after an adjustment has been made, to see that both bearings are lined up correctly, otherwise the intermittent sprocket will run out of true, resulting in the breaking out of the perforation on one side of the film.

Some Projectors provide for a side adjustment of the intermittent shaft by means of a collar and set-screw. Proper alignment is necessary to insure against the intermittent sprocket striking the film perforation off-center.

Excessive wear of the pin-cross type of intermittent movement results in flat sides on the pins, thereby causing a slightly quickened pull—down which gives an added strain on the film perforations. On newer models these pins are equipped with rollers insuring smoother operation.

Proper Alignment of Upper Magazine

One widely used projection machine has an adjustment on the top magazine which allows for its proper alignment. Unless great care is taken to see that the magazine is in line, the film coming from the valve rollers will not feed squarely under the idle roller. This generally causes fractured film to crack from the perforations to the edge of the film.

This improper alignment also causes film breaks resulting from film with nicked edges and from loose splices coming in direct contact with the side of the valve.

Size of Idler Rollers

The idler roller on the same machine mentioned above is $\frac{1}{2}$ " diameter and causes the film to make a sharp turn on itself. On a roller of this size film which has been dried out and thus has become brittle may break especially if there is an improper amount of tension on the feed roll.

If trouble of this nature is encountered the substitution of a larger roller, preferably the diameter of a sprocket namely, $\frac{15}{16}$ " is a practical remedy. This means but a small amount of work, as only a simple extension is necessary to allow the proper amount of clearance and it will be found to be well worth while. FIGURES 12 AND 13 illustrate the $\frac{1}{2}$ " roller and how the large idler roller can be installed in its place.

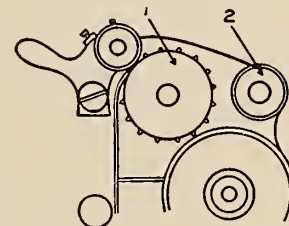


Fig. 12. Shows 1 the feed sprocket and the small roller 2.

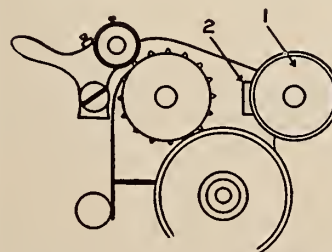


Fig. 13. Here a $\frac{15}{16}$ " idler replaced the smaller one shown in Fig. 12. The bar, 2, is the only other alteration necessary. The larger idler makes the film last longer.

Reels

Bent reels and reels with loose and sharp edged flanges should be discarded immediately. FIGURE 7, on page 32, plainly shows what happens to the film when such reels are used.

Framing

In framing a picture, it is common practice to move the framing lever very quickly. FIGURE 14 shows

what happens to the film when the framing lever is given a sharp, downward blow on a projector where the complete carriage moves as one unit. FIGURE 15 shows the same damaging result on a model on which the intermittent sprocket *only* moves in synchronism with the framing lever.

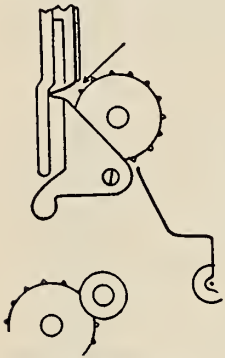


Fig. 14. Suddenly jerking the framing lever on this machine puts a kink in the film shown by the arrow. Frame carefully and slowly.

Film Loops

Excessively large upper or lower loops either cause a rattle in the film guard above or allow the film to drag in any oil which may be present below. The film also has a tendency to jump the sprockets, which can take place if the idlers are set too far from the sprockets.

The practice of resetting loops while the projector is running should be discouraged as in many cases the sprocket teeth strike outside of the perforations, or otherwise damage the film.

Film Tracks or Trap Shoes

Many scratches are caused by worn film tracks, or trap-shoes as they are known on one of the projectors, allowing the face of the film to scrape against the recessed aperture plate.

Such tracks or trap-shoes together with all tension shoes or door pads that show a "wavy" or badly worn-down surface, should be replaced by new ones.

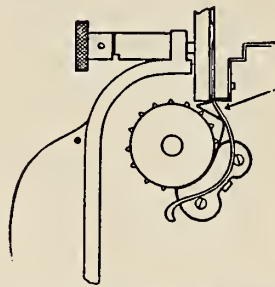


Fig. 15. On this type of projector, also in common use, buckling of the film will occur if framing is done too rapidly.

Fire or Valve Rollers

The valve rollers of both magazines should always be kept clean. Care should be taken to see that they revolve freely as a sticking roller can cause bad emulsion scratches especially if it is worn, thereby allowing the center of the roller to come in direct contact with the face of the film. This is especially true of the upper magazine rollers around which dirt and small pieces of film very often accumulate.

Adjustment of Film Trap Door

On one make of projection machine the film trap door is designed so that it can be easily removed by merely lifting it from its holder. In replacing this film trap door care should be taken to see that it is seated properly, as unless this is done one is liable to ruin the intermittent sprocket, bend the shaft as well as ruin the film which happens to be running through the projector at the time.

Strippers on Upper and Lower Sprockets

On some projectors, so called strippers or stripping plates are provided to prevent, by any chance, the film from winding around or "following" the sprockets as well as to remove any accumulation of dirt that may tend to form at either side of the sprocket teeth. In resetting these strippers after the replacement of sprockets, ex-

treme care must be taken to see that they do not come in contact with the teeth as this will cause the teeth to wear to a sharp edge which will damage any film coming in contact with it.

Unnecessary Oiling

Flooding the mechanism with oil is unnecessary and causes oil to get on the film. Dust then adheres to the film making good clear projection impossible. This practice also is a fire hazard as oily film will catch fire a great deal easier than that which is clean. Aside from the intermittent case, one drop of good oil in each oil hole will be sufficient for the average day's run.

One Method of Tracing Film Damage

Film damage can sometimes be more easily traced if it will be remembered that certain projectors run the film emulsion or dull side against all three sprockets, while on others the support or shiny side, only touches the sprockets. For example; if film is received showing tooth marks on the emulsion side, it is fairly simple to determine on what make or makes of projectors this film has been run, especially if the investigator has familiarized himself with the different types of sprocket teeth.

Why Film Should be Waxed

In conclusion, special attention is drawn to the desirability of waxing new prints along the perforations to prevent unsteadiness and premature breakdown.

In making the light sensitive emulsion of motion picture film one of the chief ingredients is gelatin—a substance which readily absorbs and gives off moisture. In freshly developed film the gelatin contains a considerably higher percentage of moisture than is found in seasoned film, and when in this condition it is easily affected by heat, tending to make it soft and tacky particularly in a moist atmosphere. The first point at which new film comes in contact with unusual temperature is at the aperture plate of the projector where the light is concentrated, producing heat to a degree which softens the gelatin and causes it to collect on the tension springs or shoes where it rapidly dries and forms a flint-like deposit. As the new film is projected, the hardened deposit of gelatin continues to accumulate and offers further resistance, causing scratches along the perforations. As the resistance increases there is the added danger of the teeth of the intermittent sprocket tearing and damaging the perforations, sometimes to an extent where injury to the print is irreparable.

Careful waxing produces, under the action of heat, a smooth and polished surface on the gelatin along the perforations; provides against undue straining during the first projections of new prints; materially benefits successive runs, and greatly prolongs the commercial life of the prints.

Cold wax should never be used as it is impossible to apply it evenly. There is also the danger with the cold method of over-waxing with the result that, in contact with the heated pressure springs, the wax melts and spreads over the picture. A very slight application is all that is necessary and is best accomplished by a waxing machine which deposits a thin layer of hot wax along the perforations. New prints treated in this manner require no further waxing.

When writing to Manufacturer or Dealer for information please mention the MOTION PICTURE PROJECTIONIST

Classified Index of Manufacturers and Dealers

including Local Addresses

The names of manufacturers are grouped alphabetically under the heading for the product they manufacture. For the benefit of the reader, the names of both advertisers and non-advertisers are included under practically every classification listed.

Dealers' names appear by states.

This entire Index is corrected monthly. So far as possible it embraces every product, every manufacturer and every dealer of interest to projectionists. Manufacturers and Dealers are requested to look over this index carefully and report to us at once if their names are missing, wrongly spelled or wrong address listed. Insertions and corrections will be made at once.

Dealers

ALABAMA

Queen Feature Film Co., 191½ Morris Ave., Birmingham, Ala.

ARIZONA

Arizona Film Supply Co., 323 Morley Ave., Nogales, Ariz.
Arizona Film Supply Co., P. O. Box 1017, Tucson, Ariz.
Chester L. Dietderich, 100-A Pleasant St., Prescott, Ariz.

ARKANSAS

Butler Theatre Supply Co., Russellville, Ark.
Ensor & Co., 215 W. 3rd St., Little Rock, Ark.
Southern Film & Supply Co., 111½ Main St., Pine Bluff, Ark.

CANADA

Cameron Bros. Theatre Sup. Co., Regina, Can.
Canadian Theatre & Elec. Supplies, 61 Albert St., Toronto, Can.
Canadian Theatre Supply Co., 12 Mayor St., Montreal, Can.
Canadian Theatre Supply Co., 22 Dundas St., West Toronto, Can.
Canadian Theatre Supply Co., Winnipeg, Can.
Canadian Theatre Supply Co., Vancouver, B. C., Can.
Coleman Elec. Co., 258 Victoria St., Toronto, Can.
C. A. Dentelback, 23 Fulton Ave., Toronto, Can.
Electrics, Ltd., Montreal Quebec, Can.
Electrics, Ltd., Toronto, Can.
Northwestern Theatre Equip. Co., 12 Mayor St., Montreal, Can.
Perkins Elec. Co., Ltd., 11 Temperance St., Toronto, Ont.
Perkins Electric Co., Ltd., 347 Bleury St., Montreal, Can.
Perkins Electric Co., 217 McDermott Ave., Winnipeg, Can.
O. J. G. Ramsey, Toronto, Can.
Aaron Stevens, 224 Eighth Ave., Calgary, Can.
Theatre Equipment Supply Co., 553 Granville St., Vancouver, Can.
United Electric Co., Ltd., 118 Granville St., Vancouver, B. C., Can.

CALIFORNIA

Bell & Slimson, 433½ E. 3rd St., Los Angeles, Cal.
Breck Photoplay Supply Co., 2028 S. Vermont Ave., Los Angeles, Cal.
Breck Photoplay Sup. Co., 98 Golden Gate Ave., San Francisco, Cal.
California M. P. Equip. Co., 836 S. Olive St., Los Angeles, Cal.
Davis Bros., 187 Golden Gate Ave., San Francisco, Cal.
Al. Du Bus, 1072 Wilton Pl., Los Angeles, Cal.
Electrical Products Co., 1128 W. 16th St., Los Angeles, Cal.
G. Gennert, 917 Maple Ave., Los Angeles, Cal.
Ed H. Kemp, 309 Turk St., San Francisco, Cal.
Los Angeles Motion Picture Co., 215 E. Washington St., Los Angeles, Cal.
Herbert S. Mace, Redlands, Cal.
G. A. Metcalfe, 117 Golden Gate Ave., San Francisco, Cal.
Miles Bros. of California, 1149 Mission St., San Francisco, Cal.

Dealers

National Theatre Supply Co., 1910 So. Vermont St., Los Angeles, Cal.
National Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.
National Theatre Supply Co., 147 Leavenworth St., San Francisco, Cal.
Pacific Amusement Supply Co., 908 S. Olive St., Los Angeles, Cal.
Walter G. Preddy, 187 Golden Gate Ave., San Francisco, Cal.
C. L. Russel, Film Exchange Bldg., Los Angeles, Cal.
J. Slipper & Co., 838 S. Olive St., Los Angeles, Cal.
Southern Electrical Supply Co., 3rd and East Sts., San Diego, Cal.
Theatre Ltg. & Equip. Co., 253 Golden Gate Ave., San Francisco, Cal.
Theatre Equipment Supply Co., 146 Leavenworth St., San Francisco, Cal.
Theatre Supply Co., 1956 Vermont St., Los Angeles, Cal.
Western Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.

CENTRAL AMERICA

J. Carter Searcy, Guatemala City, Guatemala.

COLORADO

Denver Theatre Supply Co., 2106 Broadway, Denver, Colo.
Exhibitors' Supply Co., Denver, Colo.
National Theatre Supply Co., 2106 Broadway, Denver, Colo.
Seaman Mitchell Supply Co., 428-18th St., Denver, Colo.

CONNECTICUT

Corrigan's Theatre Equip Co., 50 W. Main St., Waterbury, Conn.
National Theatre Supply Co., 131 Meadow St., New Haven, Conn.
Repas, Harries & Co., 255 Franklin Ave., Hartford, Conn.

DELAWARE

Carl B. Rehder, Wilmington, Del.

FLORIDA

Amusement Supply Co., 312½ Twigg St., Tampa, Fla.
Drollinger Theatre Supply Co., 9 S. Lee St., Jacksonville, Fla.
Griffith, G. W., Box 2333, Tampa, Fla.
Tampa Photo & Art Supply Co., 314 Twiggs St., Tampa, Fla.

GEORGIA

Consolidated Film & Supply Co., 111 Walton St., Atlanta, Ga.
National Theatre Supply Co., 102½ Walton St., Atlanta, Ga.
Southern Theatre Equipment Co., 9 Nassau St., Atlanta, Ga.
Eugene Wilde, P. O. Box 102, Atlanta, Ga.

Dealers

ILLINOIS

Acme M. P. Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Amusement Supply Co., 740 S. Wabash Ave., Chicago, Ill.
Burke & Jones, Chicago, Ill.
Capital Merchandising Co., 536 S. Dearborn St., Chicago, Ill.
Chicago Stg. & Ltg. Co., 112 N. LaSalle St., Chicago, Ill.
Chicago Cinema Equip. Co., 820 So. Tripp Ave., Chicago, Ill.
Cut Rate Supply Co., 34 E. 8th St., Chicago, Ill.
C. G. Demel, 845 S. State St., Chicago, Ill.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
Exhibitors' Supply Co., 825 So. Wabash Ave., Chicago, Ill.
Fulco Schaffer Sales Co., 24 E. 8th St., Chicago, Ill.
E. E. Fulton Ct., 1018 So. Wabash Ave., Chicago, Ill.
Holke Theatre Supply Co., 845 So. State St., Chicago, Ill.
Joseph Hopp, 57 E. Jackson Blvd., Rm. 604, Chicago, Ill.
Illinois Theatre Equip. Co., 12-14 E. 9th St., Chicago, Ill.
Kiefer Elec. Supply Co., Peoria, Ill.
Midwest Ticket & Supply Co., 845 So. Wabash Ave., Chicago, Ill.
Monarch Theatre Supply Co., 724 So. Wabash Ave., Chicago, Ill.
Movie Supply Co., 844 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 825 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 624 So. Michigan Ave., Chicago, Ill.
Royal Theatre & Supply Co., 180 East Ave., Kankakee, Ill.
Joseph Spratler, 12-14 E. 9th St., Chicago, Ill.
Western Motion Pictures Co., 102 W. Main St., Danville, Ill.
Co-operative Amusement & Supply Co., Gaiety Theatre Bldg., Springfield, Ill.

INDIANA

Exhibitors Supply Co., 128 W. Ohio St., Indianapolis, Ind.
Fort Wayne Engineering & Supply Co., 6th and No. Harrison Sts., Fort Wayne, Ind.
Fulco Sales Co., 111 So. Capitol Ave., Indianapolis, Ind.
E. E. Fulton Co., 111 So. Capitol Ave., Indianapolis, Ind.
H. Liever Co., 24 W. Washington St., Indianapolis, Ind.
Muncie Film Supply Co., 202½ E. Main St., Muncie, Ind.
National Theatre Supply Co., 128 W. Ohio St., Indianapolis, Ind.

IOWA

Blackmore, W. F., 315 Brady St., Davenport, Iowa.
Dubuque Sales Co., 2734 Jackson St., Dubuque, Iowa.
Eastman Kodak Stores, Inc., 608 Pierce St., Sioux City, Iowa.
Exhibitors' Supply Co., Des Moines, Iowa.
National Theatre Supply Co., 1004 Grand Ave., Des Moines, Iowa.
National Theatre Supply Co., 10th and High Sts., Des Moines, Iowa.
Zimmerman Brothers, Sioux City, Iowa.

Dealers**KANSAS**

Southwest Theatre Equipment Co., Wichita, Kans.

KENTUCKY

American M. P. Co., Alamo Theater Bldg., Louisville, Ky.
Blake Amusement Co., 435 So. 3rd St., Louisville, Ky.
Scheckler, Arthur V., Tyler Bldg., Louisville, Ky.
Louisville Film & Supply Co., Rex Theatre Bldg., 555 So. 1st St., Louisville, Ky.

LOUISIANA

Consolidated Film & Supply Co., 914 Craver St., New Orleans, La.
Crescent City Film Exchange, 621 Poydras St., New Orleans, La.
Electrical Supply Co., 324 Camp St., New Orleans, La.
Harcol M. P. Industries, 610 Baronne St., New Orleans, La.
National Theatre Supply Co., 610 Saratoga St., New Orleans, La.
Southern Theatre Equipment Co., New Orleans, La.
Vivirito, George, 318 Batonna St., New Orleans, La.

MAINE

Howe Theatre Supply Co., Portland, Maine.
Maine Theatre Supply Co., 263 St. John St., Portland, Maine.
Pine Tree State Amusement Co., 85 Market St., Portland, Maine.

MARYLAND

Dusman, J. F., 213 No. Calvert St., Baltimore, Md.
Haeefe, N. C., 228 Gay St., Baltimore, Md.
Lewy Studios, 853 No. Eutaw St., Baltimore, Md.
National Theater Supply Co., 228 Gay St., Baltimore, Md.
Townsend, H. S., 1625 E. 29th St., Baltimore, Md.
Wyatt, E. J., 1605 No. Milton Ave., Baltimore, Md.

MASSACHUSETTS

Eastern Theatre Equip. Corp., 65 Broadway, Boston, Mass.
Exhibitors' Supply Co., 67 Church St., Boston, Mass.
Gately, J. F., 33 Lyman St., Springfield, Mass.
Handy, A. D., Boston, Mass.
Independent Theatre Supply Co., 49 Church St., Boston, Mass.
Marson, R. D., 106 Broadway, Boston, Mass.
National Theatre Supply Co., 69 Church St., Boston, Mass.
Rotman, Morris, 26 Browning Ave., Dorchester, Mass.
United Theatre Equip. Co., 26 Piedmont St., Boston, Mass.
Wells & Douglas, 1108 Boylston St., Boston, Mass.
Wetmore, B. C., 2 Park Sq., Boston, Mass.
Wheaton, L. B., Worcester, Mass.
Worcester Film Corp., 340 Mason St., Worcester, Mass.

MICHIGAN

Amusement Supply Co., Film Bldg., Detroit, Mich.
Cinema Ser. Co., 141 Elizabeth St., E., Detroit, Mich.
Exhibitors' Supply Co., 14 Elizabeth St., Detroit, Mich.
Feldstein, A. N., 1670 Pasadena Ave., Detroit, Mich.
Theo. Kundtz & Co., 402 Lincoln Bldg., Detroit, Mich.
McArthur Equip. Co., 1963 Grand River Ave., Detroit, Mich.
National Theatre Supply Co., 2105 John R St., Detroit, Mich.
Service Theatre Supply Co., 137 Elizabeth St., Detroit, Mich.

MINNESOTA

Cunningham, H. B., 964 University Ave., St. Paul, Minn.
Exhibitors' Supply Co., 612 Producers' Exchange Bldg., Minneapolis, Minn.

Dealers

General Distributing Co., 110 Lake Ave., So., Duluth, Minn.
Huntleys, The, Winona, Minn.
Lochran Film & Slide Svc., 706 Film Exchange Bldg., Minneapolis, Minn.
National Equipment Co., 409 W. Michigan Ave., Duluth, Minn.
Northern Theatre Supply Co., 221 Loeb Arcade, Duluth, Minn.
Rialto Theatre Supply Co., 56 Western Ave., Minneapolis, Minn.
Rialott Co., The, Minneapolis, Minn.
Standard Equipment Corp., 39 Western Ave., Minneapolis, Minn.
Teco Products Mfg. Co., 245 Loeb Arcade, Minneapolis, Minn.
Twin City Caldium & Supply Co., 706 First Ave., N., Minneapolis, Minn.
United Theatre Sup. Co., 34 Western Ave., Minneapolis, Minn.
The Western Equip. Exchange, 35 Western Ave., Minneapolis, Minn.

Is your name in this index?

Is your name spelled correctly, address right?

If not, write to the Index Dept., The Motion Picture Projectionist, 45 West 45th Street, Suite 701, New York City.

Corrections will be inserted promptly.

MISSOURI

Cole Theatre Supply Co., 109 W. 18th St., Kansas City, Mo.
Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
Exhibitors' Supply Co., 3316 Lindell St., St. Louis, Mo.
Fulco-Schaffer Co., 3301 Olive St., St. Louis, Mo.
Fulton, E. E., & Co., 3403 Olive St., St. Louis, Mo.
Kansas City Mch. & Sup. Slide Co., 2449 Charlotte St., Kansas City, Mo.
National Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
National Theatre Supply Co., 3315 Olive St., St. Louis, Mo.
Opera Supply Co., 601 Shubert Bldg., St. Louis, Mo.
Sanderson Elec. Co., St. Louis, Mo.
Scewig & Engel Theatre Supplies, St. Louis, Mo.
Star Film & Supply Co., 413 Edward St., St. Joseph, Mo.
Stebbins, Charles M., Picture Supply Co., 1822 Wyandotte St., Kansas City, Mo.
Yale Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
A-A Electric Machinery Co., 1117 Cherry St., Kansas City, Mo.

MONTANA

Western Theatre Equipment Corp., Billings, Mont.

NEBRASKA

Eastman Kodak Stores, Inc., Lincoln, Neb.
Exhibitors' Supply Co., 1518 Davenport St., Omaha, Neb.
Lincoln Photo Supply Co., Omaha, Neb.
National Theatre Supply Co., 1514 Davenport St., Omaha, Neb.
Quality Theatre Supply Co., 1605 Davenport St., Omaha, Neb.
Sercie Theatre Supply Co., 303 No. 16th St., Omaha, Neb.
Service Theatre Supply Co., 303 No. 16th St., Omaha, Neb.
U. S. Theatre Supply Co., 24th and Harney Sts., Omaha, Neb.

Dealers

United Theatre Equip. Corp., 323 So. 15th St., Omaha, Neb.
Western Supply Co., 2581 Kansas Ave., Omaha, Neb.
Western Theatre Supply Co., 15th and Davenport Sts., Omaha, Neb.

NEW JERSEY

Kaufman, Frank N., 750 Broad St., Newark, N. J.
Metropolitan Motion Picture Co., 116 Market St., Newark, N. J.

NEW MEXICO

Eastern New Mexico Theatre Supply Co., Box 548, Clovis, N. M.

NEW YORK

Acme Exchange, 341 W. 44th St., N. Y. City.
Becker Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
Amusement Supply Co., 729 Seventh Ave., N. Y. City.
Atwater, L. A., 111 W. 42nd St., N. Y. City.
Auburn Film Co., Auburn, N. Y.
Auburn Theatrical Supply Co., Auburn, N. Y.
A. Z. Motion Picture Supply Co., 266 Houston St., N. Y. City.
A. Z. Motion Picture Supply, 1413 Bedford Ave., Brooklyn, N. Y.
Behrend Motion Picture Supply Co., 729 Seventh Ave., N. Y. City.
Bender, George, 28 Centre St., N. Y. City.
Better Service Film Co., 110 Ferris Ave., Syracuse, N. Y.
Capitol Motion Picture Supply Co., 727 Seventh Ave., N. Y. City.
Capitol Stg. & Ltg. Co., 626 Tenth Ave., N. Y. City.
Columbia Stg. Ltg. Co., 709 Columbia Theatre Bldg., N. Y. City.
Crouse, Hinds Co., Wolf and 7th Sts., Syracuse, N. Y.
Crown Motion Pic. Supplies, 729 Seventh Ave., N. Y. City.
Empire Theatre Supply Co., 42 Orange St., Albany, N. Y.
Empire Theatre Sup. Co., 619 Spring St., Utica, N. Y.
Fenyessey, Carol, Rochester, N. Y.
Gennert, G., 24 E. 13th St., N. Y. City.
Greenbaum, 436 Cornelius St., Brooklyn, N. Y.
Herbert & Huesgen, 18 E. 42nd St., N. Y. City.
Hudson Elec. Equip. Co., 141 W. 44th St., N. Y. City.
Independent Movie Sup. Co., 42 Orange St., Albany, N. Y.
Lyon, J. T. & D. B., Schenectady, N. Y.
Kaplan, Sam, 729 Seventh Ave., N. Y. City.
Mason, Chas. E., 103 W. Main St., Rochester, N. Y.
Mestrum, H., 817 Sixth Ave., N. Y. City.
Modern Elec. Mch. Co., 2927 Third Ave., N. Y. City.
Motion Picture Apparatus Co., 110 W. 32nd St., N. Y. City.
Motion Picture Svc. Co., 417 W. 44th St., N. Y. City.
National Theatre Supply Co., 1560 Broadway, N. Y. City.
National Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
Ostrowsky, M. J., 119 St. Louis St., Buffalo, N. Y.
Perfecton Supply Co., 98 Park Pl., N. Y. City.
S & M Sales Co., 123 Lafayette St., Utica, N. Y.
Supreme Motion Picture Repair Co., 926 Broadway, Brooklyn, N. Y.
Syracuse Supply Co., 314 W. Fayette St., Syracuse, N. Y.
United Proj. & Film Corp., 51 Chapel St., Albany, N. Y.
United Proj. & Film Corp., 228 Franklin St., Buffalo, N. Y.
Univ. Elec. Stage Ltg. Co., 321 W. 50th St., N. Y. City.

NORTH DAKOTA

McCarthy Supply Co., 619 N. P. Ave., Fargo, N. D.

NORTH CAROLINA

A. & B. Moving Picture Supply Co., Raleigh, N. C.
Carolina Theatre Supply Co., United Film Bldg., Charlotte, N. C.
Fttabran Film Co., Charlotte, N. C.
Exhibitors' Supply Co., Charlotte, N. C.
National Theatre Supply Co., 222 W. 4th St., Charlotte, N. C.

Dealers

OHIO

American Theatre Equipment Co., 165½ No. High St., Columbus, Ohio.
 American Theatre Supply Co., 310 St. Clair St., Toledo, Ohio.
 Artfilm Co., Cleveland, Ohio.
 Bodiker, D. A., 128 No. Garfield St., Dayton, Ohio.
 Central F. F. Co., 60 Public Sq., Lima, Ohio.
 Cincinnati Theatre Supply Co., Broadway Film Bldg., Cincinnati, Ohio.
 Cincinnati M. P. Co., 1434 Vine St., Cleveland, Ohio.
 Dayton Theatre Sup. Co., 225 Jefferson St., Dayton, Ohio.
 Doner, Frank M., 2409 Maple Wood Ave., Toledo, Ohio.
 Dwyer Bros. & Co., 520 Broadway, Cincinnati, Ohio.
 Exhibitors' Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Folwer & Salter, Cleveland, Ohio.
 Gill Electric Co., 46 Cypress Ave., Columbus, Ohio.
 Gross & Johnson, 2100 Payne Ave., Cleveland, Ohio.
 Limbocker, George, Springfield, Ohio.
 Motion Picture Equip. Co., 17 Ervin Block, West Canton, Ohio.
 Moving Picture Equip. Co., 208 Market Avenue, So., Canton, Ohio.
 Moving Picture Supply Co., 439 Falls Ave., Youngstown, Ohio.
 Movie Co-operative Supply Co., Cincinnati, Ohio.
 National Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 National Theatre Supply Co., 520 Broadway, Cincinnati, Ohio.
 O'Connor & Co., A., 9702 Euclid Ave., Cleveland, Ohio.
 Oliver Moving Pic. Sup. Co., Film Exchange Bldg., Cleveland, Ohio.
 Post Glover Elec. Co., Cincinnati, Ohio.
 Price, L. M., Co., 108 W. 4th St., Cincinnati, Ohio.
 Romell Motion Pictures, Inc., 1411 Walnut St., Cincinnati, Ohio.
 Runey, Clarence E., 1434 Vine St., Cincinnati, Ohio.
 Standard Film & Svc. Co., Cleveland, Ohio.
 Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Tri-State Supply Co., 2112 Payne Ave., Cleveland, Ohio.

OKLAHOMA

Anderson Theatre Supply Co., 116 So. Hudson St., Oklahoma City, Okla.
 National Theatre Supply Co., 308 W. California St., Oklahoma City, Okla.
 United Theatre Equip. Corp., 116 So. Hudson St., Oklahoma City, Okla.
 Yale Theatre Supply Corp., 10 So. Hudson St., Oklahoma City, Okla.
 Southern Theatre Equip. Co., 328 California Ave., Oklahoma City, Okla.
 Southern Radio & Supply Co., 10 So. Hudson St., Oklahoma City, Okla.
 Shelton, J. M., Oklahoma City, Okla.

OREGON

Bentley, E. E., Hillsboro, Ore.
 Conant, C. F., Portland, Ore.
 National Theatre Supply Co., 460 Glisan St., Portland, Ore.
 National Theatre Supply Co., 393 Oak St., Portland, Ore.
 Portland Moving Picture Mch. Co., Rivoli Theatre Bldg., Portland, Ore.
 Service Film & Supply Co., 393 Oak St., Portland, Ore.

PENNSYLVANIA

Alexander, George H., Diamond St., Pittsburgh, Pa.
 Atlas Supply Co., 108 Ring St., Philadelphia, Pa.
 Bennell, Chas. H., 261 No. Clarion St., Philadelphia, Pa.
 Bennett, C. H., 224 No. 13th St., Philadelphia, Pa.
 Catsiff, J., 1214 Market St., Philadelphia, Pa.
 Chamberlain Amuse. Enter., Inc., Shamokin, Pa.
 Columbia Film Service, 1010 Forbes St., Pittsburgh, Pa.
 Consolidated Film Co., 1237 Vine St., Philadelphia, Pa.

Dealers

Electric Theatre Supply Co., 1309 Vine St., Philadelphia, Pa.
 Gompertz, Abram B., Exhibitors' Clearing House & Supply Co., 1243 Vine St., Philadelphia, Pa.
 Hannson, J. G., 10th and Spring Sts., Reading, Pa.
 Hollis, Smith & Morton, 1024 Forbes St., Pittsburgh, Pa.
 Janicks, Michael, 1105 Gibbons St., Pittsburgh, Pa.
 Liberty Film Renting Co., 1012 Forbes St., Pittsburgh, Pa.
 Morton, Ed. B., 1006 Forbes St., Pittsburgh, Pa.
 Motion Picture Machine Co., 609 Neville St., Pittsburgh, Pa.
 National Theatre Supply, 1024 Forbes St., Pittsburgh, Pa.
 National Theatre Supply Co., 1311 Vine St., Philadelphia, Pa.
 Phila. Theatre Equip. Co., 252 No. 13th St., Philadelphia, Pa.
 Pittsburgh M. P. Supply Co., 1006 Forbes St., Pittsburgh, Pa.
 Rizzo, Clem, 262 No. 13th St., Philadelphia, Pa.
 S & S Film & Supply Co., A. Steinberg, 1026 Forbes St., Pittsburgh, Pa.
 Smith, Harry J., 436 Diamond St., Pittsburgh, Pa.
 Smith, H. J., Superior Motion Picture Sup. Co., 1028 Forbes St., Pittsburgh, Pa.
 Swaab & Son, Lewis M., 1327 Vine St., Philadelphia, Pa.
 Williams, Browne & Earle, 918 Chestnut St., Philadelphia, Pa.
 Cadoret, William H., Theatre Supply Co., Scranton, Pa.
 Equipment Theatre Supply Co., Penn Ave., Scranton, Pa.

RHODE ISLAND

Allen Feature Film Co., Providence, R. I.
 McKenna, James, Providence State Ltg. Co., 12 Moulton St., Providence, R. I.
 Taylor, H. O. & E. S., 76 Dorrence St., Providence, R. I.

SOUTH CAROLINA

Imperial Film Service, Greenville, S. C.

SOUTH DAKOTA

American Theatre Supply Co., Sioux Falls, S. D.

TENNESSEE

Consolidated Film & Supply Co., 226 Union Ave., Memphis, Tenn.
 Monarch Theatre Supply Co., 228 Union Ave., Memphis, Tenn.
 National Theatre Supply Co., 228 Union Ave., Bristol, Tenn.
 Paramount Film Cement Co., 519 Lookout St., Chattanooga, Tenn.
 White Theatre Equipment Co., Phipps Bldg., Bristol, Tenn.

TEXAS

Atlantic Sales Co., 1816 Main St., Dallas, Tex.
 Dallas Theatre Supply Co., 1911 Commerce St., Dallas, Tex.
 National Theatre Supply Co., 306 So. Harwood St., Dallas, Tex.
 Peerless Film Svc., 322 San Antonio St., El Paso, Tex.
 Educational Equip. Co., 1913-A Commerce St., Dallas, Tex.
 Simplex Theatre Supply Co., Film Exchange Bldg., Dallas, Tex.
 Simpson, James P., Co., Inc., Dallas, Tex.
 Southern Film Svc., 811 Franklin Ave., Houston, Tex.
 Southern Theatre Equip. Co., 1815 Main St., Dallas, Tex.
 Thrash, R.-D., Co., Film Row, Dallas, Tex.

UTAH

Alhambra Theatrical Co., Hudson Ave., Ogden, Utah.
 Argus Enterprises Co., Inc., 132 E. Second St., Salt Lake City, Utah.

Dealers

National Theatre Supply Co., 132 E. 2nd St., Ogden, Utah.
 Salt Lake Theatre Supply Co., 48 Exchange Pl., Salt Lake City, Utah.
 Universal Film & Supply Co., 56 Exchange Pl., Salt Lake City, Utah.
 Utah Theatre Supply Co., 125 E. 2nd South St., Salt Lake City, Utah.
 Worman Supply Co., 2429 Hudson Ave., Ogden, Utah.

VERMONT

Allen & Underhill, Chelsea, Vt.
 Hicks & Price, 97 State St., Burlington, Vt.

VIRGINIA

Burchard W. A., Co., 56 Commerce St., Norfolk, Va.
 Chocklett, Luther A., Co., Over Mt. Trust Bldg., Roanoke, Va.
 Southern Theatre Supply Co., 25 Old St., Petersburg, Va.

WASHINGTON, D. C.

Capitol Theatre Supply, 316 McGill Bldg., Washington, D. C.
 Carroll Electric Co., 714 12th St., N. W., Washington, D. C.
 Colman, 916 G St., N. W., Washington, D. C.
 Columbia Photo Supply Co., 1424 New York Ave., N. W., Washington, D. C.
 Fuller & D'Albert, 815 10th St., N. W., Washington, D. C.
 Higgins, F. L., 804 11th St., N. W., Washington, D. C.
 L & S Theatre Sup. Co., 908 G St., N. W., Washington, D. C.
 Theatre Supply Co., 916 G St., N. W., Washington, D. C.
 Lust, Sidney B., 916 G St., N. W., Washington, D. C.
 National Theatre Supply Co., 719 9th St., N. W., Washington, D. C.
 Scientific & Cinema Supply Co., 804 11th St., N. W., Washington, D. C.
 Southern Moving Picture Corp., 310 McGill Bldg., Washington, D. C.
 Thompson, E. B., 722 10th St., N. W., Washington, D. C.
 Washington Theatre Supply Co., 719 9th St., N. W., Washington, D. C.

WASHINGTON

Film Supply Co., 217 Virginia St., Seattle, Wash.
 Graham, John W., Spokane, Wash.
 Lowman & Handford, Seattle, Wash.
 National Theatre Supply Co., 1927 Third Ave., Seattle, Wash.
 Shearer, B. F., Inc., 210 Virginia St., Seattle, Wash.
 Spokane Theatre Supply Co., 410 W. 1st St., Spokane, Wash.
 Theatre Supply Co., 2016 Third Ave., Seattle, Wash.
 Western Poster Co., 1929 Third Ave., Seattle, Wash.

WEST VIRGINIA

Charleston Elec. Sup. Co., Charleston, W. Va.
 Charleston Theatre Supply Co., Charleston, W. Va.
 Columbia Film Svc. Co., 707 Dryden St., Charleston, W. Va.
 Educational Film Co. of West Virginia, Charleston, W. Va.
 McGray & McGray Co., 329 Main St., Fairmont, W. Va.
 Standard Theatre Supply Co., 3608 Jacob St., Wheeling, W. Va.
 West Virginia Amusement & Film Co., 113½ Capitol St., Charleston, W. Va.

WISCONSIN

Exhibitors' Supply Co., 128 W. Grand Ave., Milwaukee, Wis.
 National Theatre Supply Co., 715 Wells St., Milwaukee, Wis.
 Smith, Ray, Co., Toy Bldg., Milwaukee, Wis.
 Wisconsin Film Corp., 134 Grand Ave., Milwaukee, Wis.
 Wisconsin Theatre Supply Co., 174 2nd St., Milwaukee, Wis.

Manufacturers**Arc Lamps**

Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
 Burke & James, 425 So. Wabash Ave., Chicago, Ill.
 Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
 Cinema Studios Supply Corp., 1438 Beechwood Dr., Hollywood, Cal.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly, Inc., 129 Grand St., New York City.
 Hallberg, J. H., 445 Riverside Dr., New York City.
 International Projector Corp., 90 Gold St., New York City.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Max Mayer Co., 218 W. 42nd St., New York City.
 Motion Picture Service Co., 417 W. 44th St., New York City.
 Mestrum, Henry, 817 Sixth Ave., New York City.
 Rollaway Motor Co., 122 Southard Ave., Toledo, Ohio.
 Strong Lamp Co., 3248 Monroe St., Toledo, Ohio.
 Wohl & Co., Inc., M. J., Paynter Ave. and Hancock St., Long Island City, N. Y.

Booths, Projection

A. G. Mfg. Co., Seattle, Wash.
 Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Blaw Knox Co., Bayard and Warner Sts., Baltimore, Md.
 Edward Mfg. Co., Cincinnati, Ohio.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Goldberg Bros., 1646 Lawrence St., Denver, Colo.
 Harry Steel Co., O. K., 2333 Papin St., St. Louis, Mo.
 Johns-Manville Co., 41st St. and Madison Ave., New York City.
 Keasbey & Mattison Co., Dept. N., Ambler, Pa.
 Langslow Co., H. R., 232 Jay St., Rochester, N. Y.
 Mestrim, Henry, 810 Sixth Ave., New York City.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newman Mfg. Co., 416 Elm St., Cincinnati, Ohio.
 Riverside Mfg. Co., Newark, N. J.
 Sharlow Bros., 442 W. 42nd St., New York City.
 Steel Roofing & Stamping Works, 506 S. W. 2nd St., Des Moines, Iowa.
 Thorp Fire Proof Door Co., Minneapolis, Minn.
 Williams, Browne & Earle, Inc., 918 Chestnut St., Philadelphia, Pa.

Carbons

Arco Electric Co., 110 W. 42nd St., New York City.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Diesman, J. D., Baltimore, Md.
 M. G. Felder, 1560 Broadway, New York City.
 Hiegel, Frank J., 440 State St., Schenectady, N. Y.
 National Carbon Co., Madison Ave., N. W., and W. 117th St., Cleveland, Ohio.
 Phellis & Co., C. W.
 Hugo Reisinger, 11 Broadway, New York City.
 Warner Prod. Co., Inc., 265 Canal St., New York City.

Cases and Cans, Reel Carrying

Ajax Film Accessories Co., 30 Church St., New York City.
 American Can Co., New York City, N. Y.
 Bass Camera Co., 109 No. Dearborn St., Chicago, Ill.
 Erker Bros. Optical Co., Olive St., St. Louis, Mo.

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 Canada**

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 45 West 45th St.
 New York City**

Manufacturers

Fulton Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Gotham Can Co., 57 Eagle St., Brooklyn, N. Y.
 Indestructible Metal Products Co., 521 W. 45th St., New York City.
 Los Angeles Can Co., Los Angeles, Cal.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newmade Products Corp., 249 W. 47th St., New York City.
 Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.
 Russakov Can Co., Chicago, Ill.

Cement, Film

Bass Camera Co., 109 N. Dearborn St., Chicago, Ill.
 Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
 Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
 Eastman Kodak Co., Rochester, N. Y.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 International Projector Corp., 1130 W. Austin Ave., Chicago, Ill.
 Monarch Theatre Supply Co., 1223 So. Wabash Ave., Chicago, Ill.
 Newmade Products Corp., 248 W. 47th St., New York City.
 Rothacker Film Mfg. Co., 1339 Diversey Pkwy., Chicago, Ill.
 Technical Color & Chem. Works, 523 Third Ave., Brooklyn, N. Y.
 Weldon Film Cement Co., 301 Loeb Arcade, Minneapolis, Minn.

Film Safes and Cabinets

American Film Safe Corp.
 Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
 Columbia Metal Box Co., 226 E. 144th St., New York City.
 Duplex Motion Picture Industries, 74 Sherman Ave., Long Island City, N. Y.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Film Safe Co., 92 William St., New York City.
 Agent for American Film Safe Corp., Baltimore, Md.
 Fulton, E. E., 3208 Carroll Ave., Chicago, Ill.
 Neumade Products Corp., 249 W. 47th St., New York City.
 Peterson Co., C. J., 723 Fulton St., Chicago, Ill.
 Sharlow Bros. Co., 442 W. 42nd St., New York City.

Film Splicing Machines

Bass Camera Co., 109 N. Dearborn St., Chicago, Ill.
 Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
 Burke & James, 425 So. Wabash Ave., Chicago, Ill.
 Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
 Duplex Machine Co., 317 Seventy-Fifth Ave., Brooklyn, N. Y.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Gennert, Inc., G., 24 E. 13th St., New York City.
 Griswold Machine Works, Port Jefferson, N. Y.
 Loehren Film & Slide Co., Wm. A., 706 Film Exchange Bldg., Minneapolis, Minn.
 Neumade Products Corp., 249 W. 47th St., New York City.
 Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.

Lamps

Edison Lamp Works of the General Electric Co., Harrison, N. J.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 National Lamp Works, Nela Park, Cleveland, Ohio.
 Westinghouse Lamp Co., 150 Broadway, New York City.

Manufacturers**Lamps, Reflector**

Besseler Co., Charles, 131 E. 23rd St., New York City.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Goerz American Optical Co., 317 E. 34th St., New York City.
 International Projector Corp., 90 Gold St., New York City.
 Kleigl Bros. Universal Stage Light Co., Inc., 321 W. 50th St., New York City.
 McAuley Mfg. Co., J. E., 552 W. Adams St., Chicago, Ill.
 Morelite Co., Inc., 600 W. 57th St., New York City.
 Preddy, Walter G., 187 Golden Gate Ave., San Francisco, Cal.
 Warren Products, 265 Canal St., New York City.

Lights, Spot

Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Best Devices, 22 Film Bldg., Cleveland, Ohio.
 Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
 Burke & James, 425 S. Wabash Ave., Chicago, Ill.
 Capitol Stage Lighting Co., 626 Tenth Ave., New York City.
 Chicago Electric Sign Co., 2219 Grand Ave., Chicago, Ill.
 Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
 De Bus, Al., 1072 N. Wilton Pl., Hollywood, Cal.
 Diesman, J. F. D., Baltimore, Md.
 Display Stage Lighting Co., 334 W. 44th St., New York City.
 Ensawile, R. C., 304 W. 52nd St., New York City.
 Erikson, Electric Co., L., 6 Portland St., Boston, Mass.
 Franklin Electric Products Co., 750 Prospect Ave., S. E., Cleveland, Ohio.
 Frink, Inc., I. P., 24th St. and Tenth Ave., New York City.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly, 129 Grand St., New York City.
 Hub Electric Co., 2219 W. Grand St., Chicago, Ill.
 Kansas City Scenic Co., 24th and Harrison Sts., Kansas City, Mo.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Klouchek, Chas. E., 528 Flanders St., Portland, Ore.
 Mestrum, Henry, 817 Sixth Ave., New York City.
 Motion Picture Service Co., 417 W. 44th St., New York City.
 Newton, Chas. I., 224 W. 14th St., New York City.
 Perkins Electric Co., 21 Wilton Sq., Toronto, Ont.
 Sun Ray Lighting Co., 119 Lafayette St., New York City.
 Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Wheeler Green Electric Co., 29-39th St., Rochester, N. Y.
 Wohl & Co., M. J., Hancock St., Long Island City, N. Y.

Projectors

American Motion Picture Projector Co., 1134 W. Austin Ave., Chicago, Ill.
 Baird Motion Picture Machine Co., 31 Runyon St., Newark, N. J.
 Bell & Howell Co., 1801 Larchmont St., Chicago, Ill.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 International Projector Corp., 90 Gold St., New York City.
 Kaplan, Sam, 729 Seventh Ave., New York City.

Manufacturers**Reels, Film**

Acme Stamping & Mfg. Co., Pittsburgh, Pa.
 Duplex M. P. Industries, Inc., Long Island City, N. Y.
 Geometric Stamping Co., 221 E. 131st St., Cleveland, Ohio.
 Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, Ohio.
 Goldberg Bros., 1646 Lawrence St., Denver, Colo.
 Heigel, Frank J., 440 State St., Schenectady, N. Y.
 Mossberg Co., Frank, Attleboro, Mass.
 Neumade Products Corp., 249 W. 47th St., New York City.
 Sharlow Bros. Co., 442 W. 42nd St., New York City.
 Taylor-Shantz Co., 478 St. Paul St., Rochester, N. Y.
 Winship & Sons, W. W., Utica, N. Y.

Reflectors, Light

American Reflector & Lighting Co., 100 So. Jefferson St., Chicago, Ill.
 Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
 Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
 Curtis Lighting Co., 1119 W. Jackson Blvd., Chicago, Ill.
 Erickson Electric Co., 6 Portland St., Boston, Mass.
 Frink, I. P., Inc., 239 Tenth Ave., New York City.
 General Outdoor Advertising Co., 550 W. 27th St., New York City.
 Heinrich Reflector Co., 645 W. 43rd St., New York City.
 Hub Electric Co., 2219 W. Grand Ave., Chicago, Ill.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Major Equipment Co., Inc., 4603 Fullerton Ave., Chicago, Ill.

Rewinders

Atlas Metal Works, Dallas, Texas.
 Automatic Film Rewinder, Harrisburg, Pa.
 Bass Camera Co., 109 Dearborn St., Chicago, Ill.
 Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill.
 Best Devices Co., 1514 Prospect Ave., Cleveland, Ohio.
 Duplex Machine Co., 316-75th St., Brooklyn, N. Y.
 Electrical Prods. Corp., 1122 W. 16th St., Los Angeles, Cal.
 Lang Mfg. Works, Olean, N. Y.
 Neumade Products Corp., 249 W. 47th St., New York City.
 Stern Metal Works, 1006 Vine St., Philadelphia, Pa.

Rheostats

Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
 Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
 Cuttler Hammer Mfg. Co., Milwaukee, Wis.
 Duplex M. P. Industries, Inc., Long Island City, N. Y.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly Co., 129 Grand St., New York City.
 Hertner Electric Co., 1900 W. 112th St., Cleveland, Ohio.
 Hoffman & Soons, 522 First Ave., New York City.
 Hub Electric Co., 2219 Grand Ave., Chicago, Ill.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Leonard Electric Mfg. Co., 3709 Perkins Ave., Cleveland, Ohio.
 Newton, Chas. I., 331 W. 18th St., New York City.
 Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
 Wheeler-Green Electric Co., 29 St. Paul St., Rochester, N. Y.

Manufacturers**Screens**

American Silversheet Co., 915 Washington St., St. Louis, Mo.
 Da-Lite Screen Co., 922 W. Monroe St., Chicago, Ill.
 Diamond Screen Products Co., 1222 Ontario St., Cleveland, Ohio.
 Gardiner Co., L. J., 1021 W. Goodale Blvd., Columbus, Ohio.
 Minusa Cine Screen Co., 2665 Morgan St., St. Louis, Mo.
 Mirror Screen Co., Shelbyville, Ind.
 National Screen Co., 2100 Payne Ave., Cleveland, Ohio.
 Premier Screen Co., P. O. Box 861, Roanoke, Va.
 Raven Screen Corp., 1476 Broadway, New York City.
 Rembusch Screen Co., Shelbyville, Ind.
 Royal M. P. Screen Co., 910 Manhattan Ave., Brooklyn, N. Y.
 Spencer Lense Co., 442 Niagara St., Buffalo, N. Y.
 Story Scenic Co., 21 Tufts St., Somerville Sta., Boston, Mass.
 Trans-Lux Daylight Picture Screen, Inc., 247 Park Ave., New York City.
 Walker Sunlight Screen Co., 359 Canal St., New York City.
 Werstner & Son, C. S., 211 N. 13th St., Philadelphia, Pa.
 Western Shade Cloth Co., 22nd and Jefferson Sts., Chicago, Ill.

Slides

Acme Slide Studio, 1026 Market St., San Francisco, Cal.
 American Slide Co., 165 No. High St., Columbus, Ohio.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Excelsior Illustrating Co., 219 Sixth Ave., New York City.
 Kansas City Slide Co., 1015 Central St., Kansas City, Mo.
 Lochran, Wm. A., Film Exchange Bldg., Minneapolis, Minn.
 Midland Cine Products Co., 706 First Ave., North Minneapolis, Minn.
 Milano Slide Co., 112 W. Broadway, Salt Lake City, Utah.
 Niagara Slide Co., Lockport, N. Y.
 Paramount Publicity Corp., 111 Westchester Sq., Bronx, N. Y.
 Radio Mat Slide Co., 167 W. 48th St., New York City.
 Ransley, J. F., 337 Madison St., W. Chicago, Ill.
 Standard Slide Co., 209 W. 48th St., New York City.
 Unique Slide Co., 168 W. 48th St., New York City.

Tachometers

Weston Electric Instrument Co., 4 Weston Pl., Newark, N. J.
 Blanchard Instrument Co., Cambridge, Mass.
 Consolidated Instrument Co., 41 E. 42nd St., New York City.

Meters, Electrical

Weston Electrical Instrument Corp., 7 Weston Pl., Newark, N. J.
 Jewell Electrical Inst. Co., 2 Vesey St., New York City.

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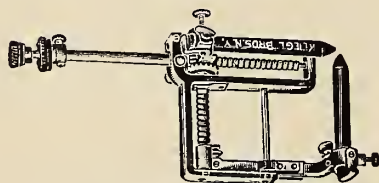
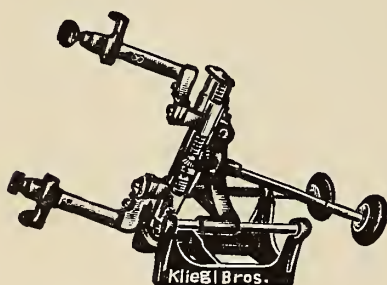
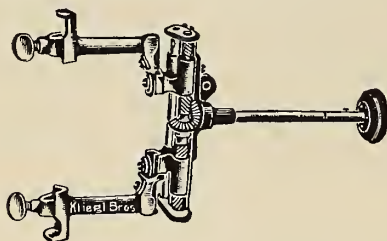
Recollections of An Old Timer

(Continued from page 12)

the center of the town. Hailing a farmer we inquired the nature of the blaze.

He replied, "Oh, it's all over now. The Old Opera House burned to the ground."

The Howe shows are credited with having first introduced the motion picture to many states in this country. Of course, the cradle of the industry and also the scene of greatest exhibition activity was in New York, but the rest of the country depended for their movies on the travelling shows, of which there were many in those days.



OLD BURNER DESIGNS

Prior to my connection with the Howe troupe, and during the period when Lyman Howe was preparing to supplant his stills with moving pictures, he used a small roll of film, joined into a loop, which he continued to run through the machine as long as the audience applauded. Howe also used a phonograph in his show, and one of the highlights of his program was the playing of a Sousa record, which, unhappily, was badly cracked. At the conclusion of the record Howe explained to the audience that the grinding noise which had issued from the phonograph was the result of the passage of elevated trains by the recording laboratory.

Included in the Howe program was a subject depicting the hatching of a chick. I had happened to secure an Allen Adjustable Lens with which I could produce effects that startled the audience.

I used this lens with great success in connection with the showing of the chick-hatching film. At about just the time the egg would start to open I would so manipulate the lens that the image of the bursting egg shell, starting from a small light point, would gradually enlarge until it occupied the whole screen when the chick finally emerged from the shell.

The Howe troupe gave the first exhibition of moving pictures ever shown at the Hippodrome, New York, on February 14, 1909. At this time 30 amps was the highest permitted in New York, which amperage certainly was not conducive to good projection.

During the rehearsal for this show we were visited by the city inspector, Jack Skerret, who, after watching the picture for a while, inquired how we managed to get such a well illuminated picture on such low amperage. We naively attributed our success to our ability and to the excellence of our equipment. But Skerret was unconvinced. Approaching the fuse block he took out the screw plug and—out rolled a penny.

Turning to me, Skerret remarked, "Yes, you certainly have the finest of equipment."

I remember playing one town which had only one projection machine, thus making it almost impossible to give a continuous performance. I got around this difficulty by clipping a title from the beginning of each reel, having it photographed and enlarged onto a slide, which was projected until the following reel was ready to run.

After about five years travelling on the road with the Howe troupe I returned to New York, where I have been active as a projectionist ever since.

Many wonderful improvements have been made in the projection field since I had my first assignment, and the equipment and facilities of today are scientific in their precision and power. But I look to even more rapid advances within the next several years. I believe coming improvements will include the perfection of third dimension photography and natural color photography, as well as speedy development in the talking film field.

Better Yourself In Your Craft

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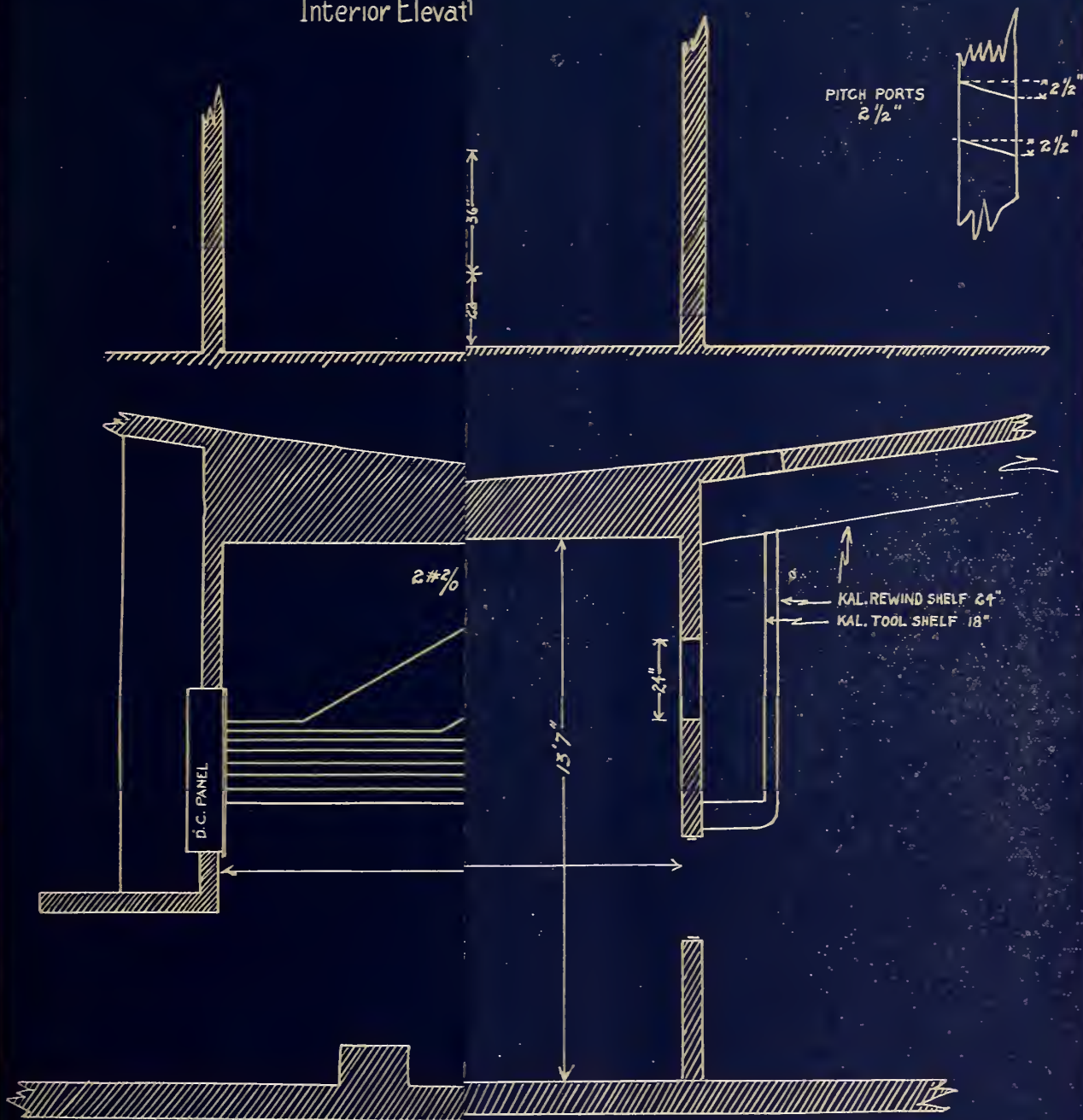
\$2.50 Per Year thereafter

THE MOTION PICTURE PROJECTIONIST

45 WEST 45th STREET, Suite 701

NEW YORK CITY

Interior Elevat¹



MENT:

The Projection room above is laid out to use room should be painted dark olive green 4' 0" high from floor, light 2 Stereo and Effect Projectors, 2 Spot lamps and 1 K and the ceiling a pea green.

One projection port is designed to permit the use three indirect fixtures on ceiling. Reelites at each piece of equipment

The room is designed to allow the center projection these work on spring-like roller slides and are out of the way when the theatre whenever desired.

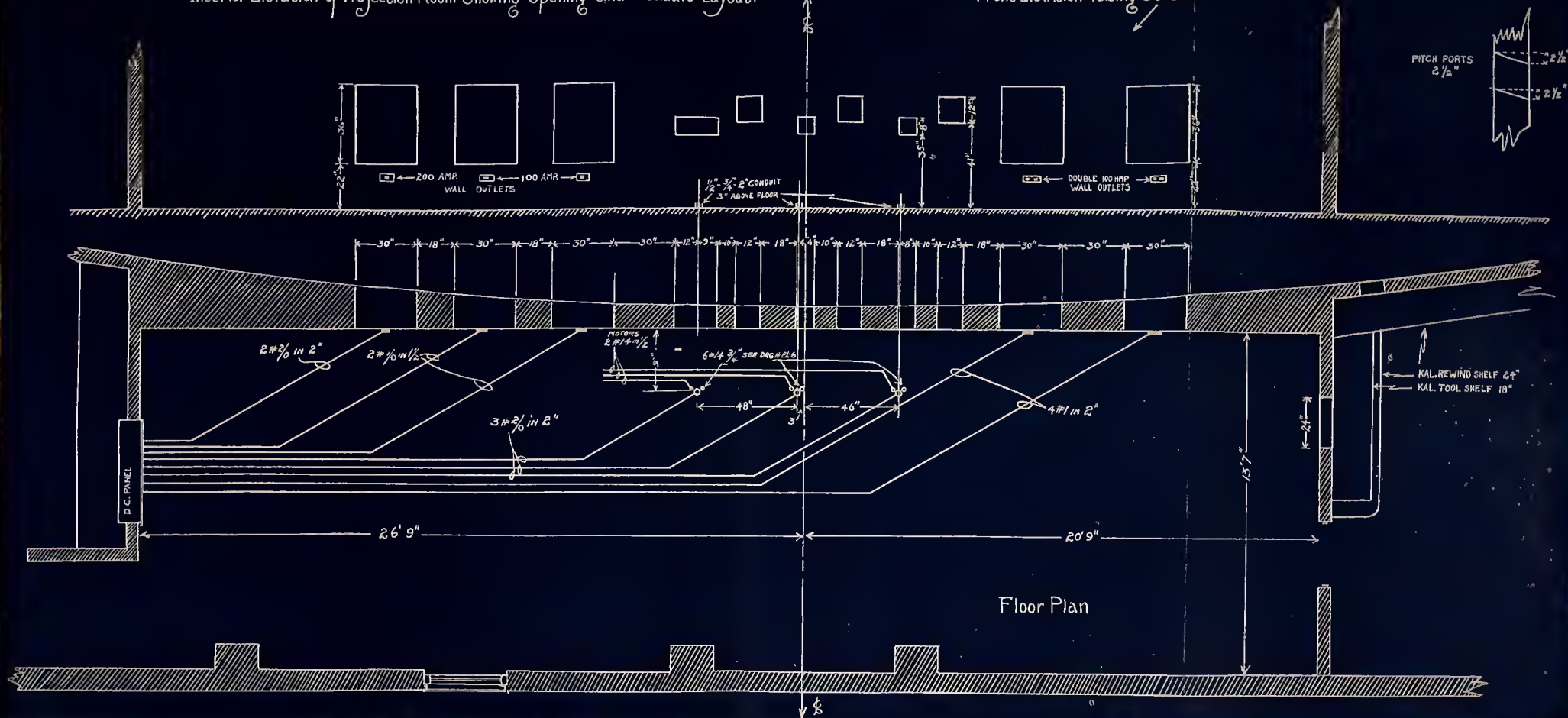
Ports for spots and effects are designed to permit space must be allowed for quick, convenient handling of equipment—and allow any point of the theatre to be reached easily are feet per unit of equipment.

The Conduit is laid out to permit the arc leads, shown. Subject to local ordinances. Projection room should have one shutter leads to come up through projector and pedestal projector lamp. It should have an exhaust fan for general projection

Spots, flood and effects projectors are arranged a fresh air intake. Windows should be included wherever possible.

Interior Elevation of Projection Room Showing Opening and Conduit Layout.

Front Elevation Facing Screen



WIRING DIAGRAM FOR A PROJECTION ROOM FOR THE FOLLOWING EQUIPMENT:

The Projection room above is laid out to use the following equipment: 3 Projectors, 2 Stereo and Effect Projectors, 2 Spot lamps and 1 H.I. Flood Lamp.

One projection port is designed to permit the use of the projector for flood or effects.

The room is designed to allow the center projector to be placed in the center line of the theatre whenever desired.

Ports for spots and effects are designed to permit easy handling of these instruments and allow any point of the theatre to be reached easily.

The Conduit is laid out to permit the arc leads, motor leads, and electro change-over shutter leads to come up through projector and pedestal.

Spots, flood and effects projectors are arranged to be operated from wall pockets.

This is done to facilitate the use of additional equipment at any time.

Headroom of 10' 0" always maintained.

Specifications for correct conduit and wire sizes are shown on plan.

Lavatory is built in every projection room.

D.C. Panel is arranged for convenience and economy in wiring from equipment to Generators or service. Rheostats placed as close as possible to panel for same reason.

Port shutters are not shown. These are subject to change in different localities to meet local ordinances.

Projection room, rewind room and Generator room covered with green battleship linoleum. This eliminates dust and is easily cleaned.

The projection room should be painted dark olive green 4' 0" high from floor, light olive green to ceiling and the ceiling a pea green.

Lights: Two or three indirect fixtures on ceiling. Reelites at each piece of equipment mounted on wall. These work on spring-like roller slides and are out of the way when not in use.

Sufficient floor space must be allowed for quick, convenient handling of equipment—never less than 40 square feet per unit of equipment.

Ventilation not shown. Subject to local ordinances. Projection room should have one exhaust fan for each projector lamp. It should have an exhaust fan for general projection room ventilation and a fresh air intake. Windows should be included wherever possible.



Definition of Terms Pertaining to Films and Projection

Aperture—The opening thru which the light passes between its source and the screen. The film passes vertically at the aperture.

Cement—A chemical solvent used to join two pieces of film together. Ether is one of its active constituents. Film cement evaporates quickly, therefore should be kept in tightly corked containers.

Exchange—A central depository from which film may be bought, rented, or borrowed.

Film Mender—A clamp-like device used to facilitate the splicing of film.

Footage—Refers to length of a roll of film.

Frame (noun)—Refers to a single photograph in the roll of film. There are 16 frames to every foot of standard film.

Frame (verb)—The operation of correctly aligning the picture on the screen. "Framing" is accomplished by moving a lever or some other similar device.

Frame Line—The line that divides the top of one image from the bottom of the other. This line is observed when picture is in mis-frame on the screen.

Geneva Movement—A form of intermittent movement first used in Geneva, Switzerland; hence the name. It is the form of intermittent movement that is most used.

Intermittent—The device that moves the film normally at 16 frames per second.

Leader—Blank or opaque pieces of film at beginning of the reel placed immediately ahead of the title. It is placed there to facilitate threading the projector and to protect the first few feet of the title.

Legend—Titles and Subtitles—Words of explanation descriptive of various scenes in the film.

Loop—Slack places left in the film, one immediately above the aperture and another immediately after the intermittent sprocket.

Mazda Equipment—The incandescent lighting unit used in professional projectors. All portable and semi-portable machines are equipped with incandescent lamps. Carbon arcs are used in professional projectors. Where it is necessary to project pictures at great distances carbon arcs are always used. Mazda equipment is coming to be used more and more as times goes on, for shorter projection distances.

Misframe—Caused by an improperly spliced film, or incorrect threading of projector.

Operator—The individual who manipulates the projection apparatus.

Perforations—Sometimes called sprocket holes—on both edges of the film. In standard film there are 64 perforations on each edge, per foot.

Positive Print—Film exposed to light behind a negative. The positive is used in the projector.

Patch—See Splice.

Projector—An apparatus provided with the necessary devices for showing pictures on a screen.

Projectionist—A skilled operator of motion picture apparatus—an expert.

Rain Streak—Tiny scarlet in the emulsion that soon accumulate dirt. Caused by dirty projector or "pulling down" film.

Reel—The spool upon which film is wound. Sometimes the term reel refers to the film itself as well as the spool upon which it is wound.

Rewind (noun)—A device used to change film from one spool to another either for the purpose of inspection or to make it ready for the next exhibition.

Rewind (verb)—To change film from one reel to another.

Screen—A surface upon which the picture is projected.

Safety Shutter—Sometimes called fire shutter. The safety shutter is located between the film and the light source and opens or closes at the aperture automatically when the machine starts or stops.

Shutter (Revolving)—The device used to intercept the light during the time the film is in motion at the aperture. The shutter also serves to minimize the flicker on the screen by increasing the oscillations of light and shade to such a frequency that the eye cannot detect them. Two blade and three blade shutters are in general use.

Splice—A place where two pieces of film have been joined by use of film cement. Such a union is sometimes called a patch.

Sprocket Wheels—The revolving toothed wheels that engage the perforations and thereby move the film thru the projector. There are usually three such sprockets; one found immediately after the film leaves the reel; the intermittent sprocket which jerks the film sixteen times per foot between the loops and the lower or take-up sprocket from which the film passes directly into the take-up reel.

Take-Up—The device used to wind the film as it passes thru the projector.

Tension Shoes—Found on either side of the aperture. They hold the film gently yet firmly against the aperture.

Throw—Distance from screen to the projector.

Trailer—Blank or opaque pieces of film at the end of the reel. This is placed there as a protection against damage to the valuable film in the reel.

Travel Ghost—The peculiar hazy appearance often seen in a motion picture. It is produced by the improper setting of the revolving shutter.

Lens Definitions

Axis, Principal—A straight line drawn through the centers of curvature of a lens or in case of a lens having one curved and one plane face, it is a line through the center of curvature of the one face, and perpendicular to, and thru the center of the other face.

Center of Curvature—Since a lens is made up of the intersection of two spheres, or of one sphere and one plane, the center of curvature of the lens may be considered as the center of the sphere of which its face is a part.

Condensers—The lens combination which deflects the divergent rays of the luminant into the objective.

Focus, Equivalent—The equivalent focus of a plurality of lenses in combination is the focal length of a simple thin lens which will, under all conditions, form an image having the same magnification as will the given lens combination.

Focal Length—The distance from the center of the lens to the principal focus is called the focal length.

Focus, Principal—The principal focus of a lens is the point on the principal axis at which rays parallel to the principal axis come to a focus.

Lens—A lens may be defined as a piece of glass, or other transparent substance, having two curved surfaces or one curved and one plane surface.

Objective—The picture-forming member (lens) of the optical system. This is sometimes called the projection lens.

Projection Lens—Properly called projection objective.

Projection Distance—The distance between the objective and the screen of a stereopticon or motion picture projector.

Working Distance—The distance from the slide or film in a system to the nearest lens of the objective.



The Lens System

The objective or projection lense is the picture-forming lens combination and is an important part of the projection machine. This lens system is made up from a number of separate lenses and the combination is mounted in a metal tube.

The amount of light transmitted by the lens indicates to a large degree the brightness of the picture on the screen. This amount of illumination that is transmitted depends upon the cleanliness of the lens. Dirty lenses mean loss of light and subsequent loss of definition. Finger marks cause dirty lenses.

A soft linen cloth is the best for cleaning lenses. This cloth should be washed frequently. To remove finger marks, breathe upon the surface of the glass and wipe lightly with a circular movement. Never use any kind of polishing material, alcohol, or any other solvent on a lens.

The various parts of the lens are cemented together with Canada Balsam. Therefore the lens should not be exposed to the heat of the sun or of steam pipes. Lenses should not be allowed to remain for a long time in a damp place.

In any projection apparatus the condensing lens system has as its function the gathering up of as great a volume of light as possible, and the concentration of the light which it gathers at the center of the objective when the objective is located at the proper distance from the slide or film. This distance is determined by the focal length of the objective.

The condensers should be cleaned carefully with a clean, soft, linen cloth. If the condensers are removed from their mountings great care should be taken when replacing them.

Condenser breakage is often due to unequal expansion or contraction caused by sudden extreme changes in temperature.

Motion Picture Film

Inflammable and Non-Inflammable

There are today, two general types of motion picture films in use, the nitrate of cellulose or inflammable stock and the acetate of cellulose or non-inflammable stock, more familiarly known, perhaps as "safety" film. "Safety" film is so indicated by the word "safety" which is printed at intervals along the outer margin of the film.

The inflammable stock is used almost entirely in theatres while the "safety" stock is coming to be used more and more for educational purposes.

Theatres are better able to cope with the fire hazard, and inasmuch as "safety" film is much more subject to deterioration than the inflammable stock, they do not use "safety" material extensively.

Booth Requirements

The National Board of Fire Underwriters specify that all projectors must be enclosed in standard fireproof booths when using inflammable stock. Certain portable

projectors are authorized for use by non-professional operators and with slow-burning or non-inflammable stock, standard width, without booths. Local ordinances and electrical codes should be consulted at all times.

The following contribute to rapid film deterioration and subsequent projection difficulties:

- Dirt accumulations.
- Worn sprocket teeth.
- Too strong tension.
- Poorly adjusted idlers.
- Misalignment of working parts.
- Surplus of oil and grit.
- Accumulation of loose emulsion and wax.
- Careless rewinding, packing, shipping, and storing.

Receipt, Storage, and Shipment

Immediately on receipt of the film program it is always desirable to rewind the program, inspect the films, and if necessary, clean them. The exchange tries at all times to keep the films in the best possible condition, but occasionally a reel will "slip through the hands" of an inspector who may be a bit careless.

Film should always be kept in metal containers when not in the projector or in the process of inspection.

All film will dry out and become brittle if exposed to the air for long periods. "Safety" or non-inflammable stock dries out very quickly.

If the film is dry and brittle it may be made much more pliable by winding loosely and placing it in a human atmosphere. A basement, far removed from fire or furnace, a cellar or cave, make excellent storage rooms. Sometimes a few blotters containing moisture placed in the metal film box will prove advantageous.

Humidor cans, one type of which is illustrated in Figure 14, are for sale by dealers. A solution of eucalyptol, camphor, menthol, and glycerine is reputed to soften even the most brittle and least pliable film. Extreme care must be exercised in any case so that the moisture does not come in direct contact with the emulsion. When films lose their original pliability it is difficult to bring that quality back, permanently, by any artificial means. For that reason film should be kept in a humid atmosphere at all times or inside tightly closed metal containers.

No film should be left exposed at any time. The small pieces which accumulate during repair operations should never be permitted to accumulate on the bench or on the floor. They should be deposited in a tight metal box and removed to some safe place outside of the building where they may be destroyed.

If handled with the same precautions as are necessary for safe handling of gasoline, kerosene, oil, ether,

celluloid toilet articles or even the rolls of film used in a camera or Kodak, the danger involved with motion picture film is small. A bucket full of sand, wet sawdust, a chemical fire extinguisher or even a wet woolen blanket should be kept handy to be used in case of an emergency.

Following the exhibition, film should be replaced on exchange reels, the film retained by securely fastened reel bands, and each reel immediately placed in the metal film container.

Removal of Oil and Dirt

If for any reason a surplus of oil accumulates on the projector it is quite likely that some will fall on the film, and tend to hold any dust or dirt that may come in contact with it. This oil and dirt may deposit around sprockets, in the idlers, in the film track, and at the aperture opening, and may interfere with perfect projection or damage the film itself. There are several simple film cleaners on the market that may be bought at small cost. In the absence of a film cleaner, a soft lintless cloth held in contact with both surfaces of the film will serve very acceptably. It is quite important to use clean cloths frequently as old ones become soiled. If soiled cloths are used there is a likelihood that rain streaks will be produced. A stiff-bristled tooth brush may be used to remove dirt from the parts of the projector.

New film is said to be "green." In order that it will pass through the projector satisfactorily, the film must be waxed. When a new film is projected, if it is not waxed, an accumulation gathers on the tension shoes immediately in front of the aperture, and on other surfaces. This substance becomes very hard and difficult to remove. It may be removed by using alcohol as a solvent, or scraping the accumulation away with a coin. Never use a knife because steel will scratch the surfaces. Dirt deposits, scratches, and dirt all tend to injure the film. The photographic quality may not be injured but the film surrounding the sprocket holes may be scratched quite badly.

Keeping a projector clean is an important task of the projectionist.

Splicing "Safety" or Non-Inflammable Stock

"Safety" or non-inflammable stock has certain properties that tend to make it, in many cases, somewhat difficult to splice. The two parts of the film should be prepared in exactly the same way as indicated above. However, in this case, it will aid materially if the celluloid side of the film that is to be used in the splice, could be abraded or scraped slightly. When splicing this type of film use cement that has been prepared for both inflammable and non-inflammable film. Another aid is to add a very small amount of glacial acetic acid to the bottle of cement. A few drops added to a small bottle of cement will suffice. When splicing "safety" film it is necessary to work very quickly. *Remember not to use too much cement.*

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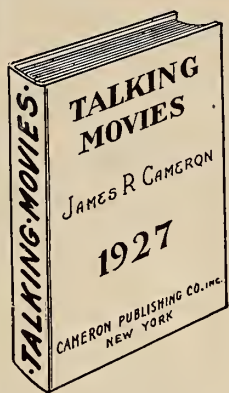
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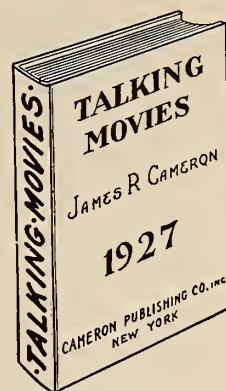
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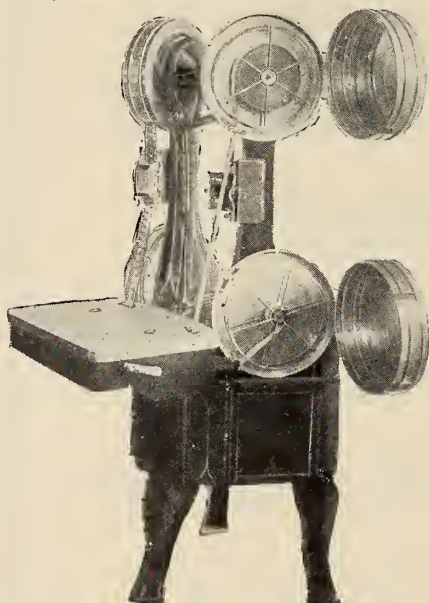
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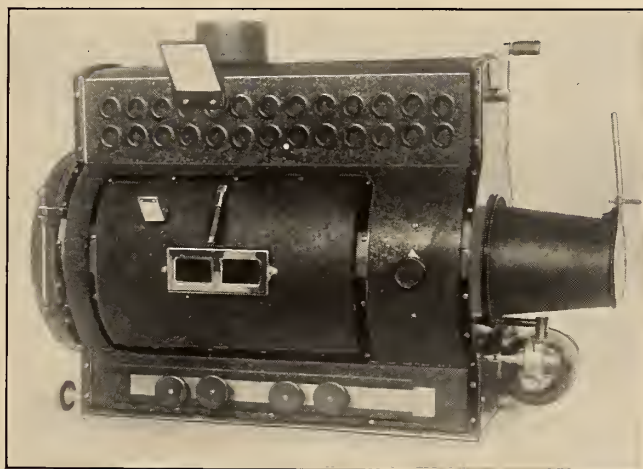
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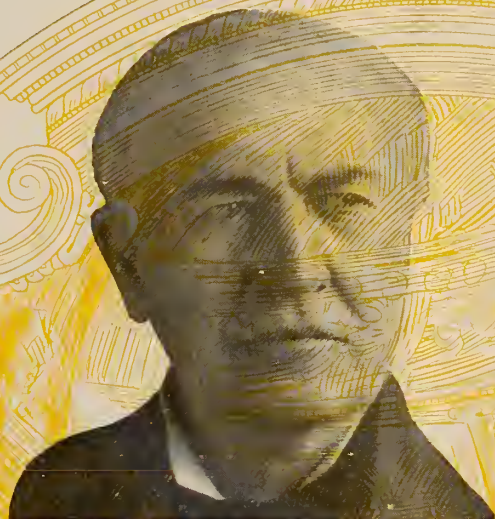


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THE MOTION PICTURE PROJECTIONIST

of the UNITED STATES

and CANADA



*From the Laboratory
of
Thomas A. Edison,
Orange, N.J.*

September 19, 1927.

Editor
Motion Picture Projectionist,
45 West 45th Street,
New York City.

My dear Sir:

I am happy to accept your invitation to send a message to the men who run the projecting machines. In their hands is the power to make or mar the pictures they receive. Urge them to respect the accomplishments of others if they would have their own work appreciated. I extend to them and to your new publication my best wishes.

Very truly yours,

Thomas A. Edison.

TAE:O

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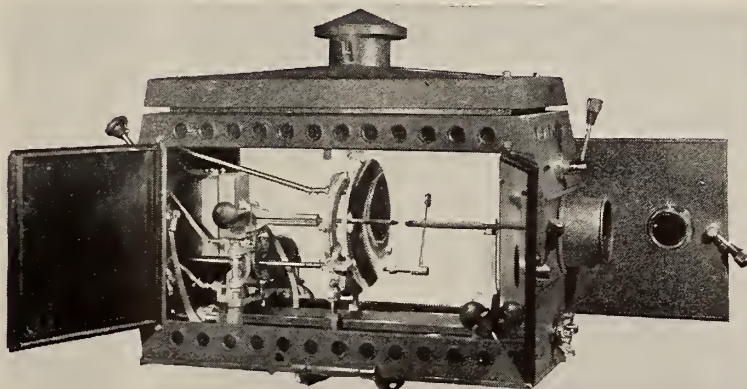
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News Items about yourself and other Projectionists. Report as often as you can the progress your Local is making. Pass it on to the rest of the boys in the country.

Feature articles on the Science and Art of Projection from your own experience. Be entertaining if you like or be instructive. Send along all photographs or diagrams that go with it.

Pictures of yourself.

Reports of stunts you have devised for your booth to make projection easier or more efficient and diagrams of these stunts.

Questions about Projection problems that bother you. They will be answered promptly by experts in a special department called Questions and Answers about Projection.

News from Locals will be published under a heading devoted exclusively to the Local from which the news comes. Every Local in the country will have its own corner in this publication.

A New Coloring Process

Before a group of scientists, educators, and representatives of motion picture producers, a private showing of what is claimed to be the first optical multicolor process perfected for motion pictures, was given at a studio in Pittsburgh last week.

The process is the invention of Harold N. Cox, of Pittsburgh, formerly of the Edison Research Laboratories, and the demonstration was arranged in honor of Mr. Burton Holmes, who was in the city for the occasion.

During the exhibition, a rainbow standing out in all its colors was thrown upon the screen. Women dressed in the gayest of shawls, with scarfs and fans of varied colors, crossed the screen, their costumes showing the much sought purples and lavenders as well as ivory and flesh tints which have been found difficult to reproduce.

Mr. Cox, in a short statement preceding the showing, stated that the process is the use of a simple lens attachment which can be placed upon any camera and the pictures taken in the ordinary way, developed in any laboratory fitted to turn out the ordinary motion picture, printed on black and white stock neither tinted nor toned nor in any way artificially colored, with regular printing equipment, projected on any projector by using a similar lens attachment, and shown on any screen. The process, he said, can reproduce every color or shade which the eye can perceive. True blues and purples, which no two-color method will show, are reproduced in their natural color.



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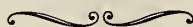


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"A Magazine Devoted to Projection and Projectionists"

NOVEMBER 1927

Founded 1927

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FRANK R. DAY }

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Diagram of a Roth Generator

Special Blue Print Section

And other features including Permanent Dealers and Manufacturers
Index, Letters from Readers, New Equipment, News from the Locals,
Pictures and many more interesting and informing items.

Note: The Motion Picture Projectionist does not assume responsibility for
the statements and opinions appearing in signed articles in its columns. The
leading experts in each phase of projection are asked to contribute and they
are free to express their own theories and experiences. Accuracy alone is
insisted upon.

"In the Projectionist's hands is the power to make or mar the pictures they receive."

—THOMAS A. EDISON

A CHAT WITH THE EDITOR



The Voice of the Craft!

WE had planned in this issue and on this page to write on several subjects which we knew would interest Projectionists greatly: of the awakened spirit of mutual friendship and helpfulness between all members of this great craft and the desire of individuals to make swifter and surer progress in it. This last was indicated to us dramatically by the great number of subscriptions that keep coming into our offices and the many letters we are receiving daily. A craft that wasn't alive to every opportunity to learn, ready to seize upon everything which would make it more efficient, more resourceful, more self-reliant, more powerful and ready for more knowledge would never have welcomed a new paper as Projectionists have welcomed The Motion Picture Projectionist.

Then, one day, we received a letter from Alfred Criswell, Secretary of the Pittsburgh Local asking us to write him in more detail of the purposes of this paper. It struck us that it would be a good idea to restate our ideals and our purpose—in this the second issue. Time enough later in the years that are to come to take up the many subjects that are crying for editorial discussion.

If our editorial in the first issue did not clearly state our aim it must have been because it was written with passion and passion often obscures the issue. Standing at Broadway and 42nd Street and looking up Times Square soon after dark, seeing the myriad of blazing many-colored electric signs that proclaim the world's greatest show thoroughfare in the world's greatest city and thinking of the men high up in their Projection Rooms unrolling reels and reels of entertainment before an

audience of nearly half a million people in Times Square alone, one becomes convinced that these men should have a paper to proclaim them and through which they can proclaim themselves to all the world. They needed a paper which would speak for them, entertain them, instruct them, bind them closer together in a finer and more splendid feeling of common fellowship and singleness of purpose in their work. This and other similar thoughts on a windy evening in March of this year gave birth to The Motion Picture Projectionist as it is today.

Our aim after all, can be stated very simply. We wish only to be of the greatest help possible to Projectionists, no matter who they are, or where they are, provided only they are organized in Unions. We have no thought for those who are not—for these are the men who are not yet conscious of the power and the strength that lies in organization and do not yet feel their kinship to the working class as a section in our present economic structure. Whether we can speak for or entertain and instruct Projectionists is of real consequence at this time: we solicit at all times the aid, the suggestions, the sympathetic understanding of all Projectionists because it is only by a complete co-operation of this sort that we will be able to make this publication the success it deserves to be—a fact that Projectionists have already decided—if the several odd thousand subscriptions that we have received is an indication—and we believe it is.

Our aim then: To help the craft, to speak for it, to give it the authority and the prestige it has long deserved.

A New Way of Hanging the Screen

By H. H. STOLL

EVER since I have been a Projectionist I have always been disturbed by the eye-strain which I knew audiences in nearly all motion picture theatres were suffering because of a too conventional method of hanging the screen. Placing the screen as a white spot flat against a dark background was to my mind not the most satisfactory way. I was sure that a study would reveal a new way or certain improvements which would take away all eye strain.

Our method eliminates the entirely dark field by removing the screen from the usual position as a pure white



H. H. STOLL

spot in the center of a stage mask or curtain. The screen is set forward, and hangs out in free space, away from all fabric. About ten feet back of the screen hangs a full stage black velour cyc curtain, and a black ground-cloth is used to cover the stage floor. Back of the screen, between the sheet and the black cyc, is a "curtain" of blue light, thrown from the third border light, which helps to still further "recede" the background.

The sheet is stretched around a frame the exact size of the projected picture, and the border is reduced to a minimum. Owing to the presence of keystone, it is not feasible to eliminate the black border entirely. But we have reduced this to a small band, of black velvet, which is stripped around the screen on the back side of the frame. The border is so small that there is no effect of contrast between this frame and the illumination on the screen.

The arrangement improves the visual conditions under which the spectator views the pictures. The deep blue background supplies all the contrast needed for effective

LET THEM NOT FORGET

SO tremendously has the theatre developed that the first nicoret could easily be fitted in the lobby of any one of the theatres recently opened in Times Square. Improvement suggesting improvement, step supplementing step—the dingy, bleary screen movie has come into the present high estate of the modern theatre. For this, no little credit is due to the little big men of the mighty industry — to the various mechanics—to the various inventors of booth and stage equipment, and last but not least to the Projectionists. Let the public, the directors, the scenario writers, the screen heroes, the showman, never forget the constructive powers that lie within the men who are constantly striving to improve the presentation of film — the Projectionists.

projection, and at the same time reduces the strain caused by steady focussing of the eyes on the brilliantly lighted screen surface.

Since the small black border is not on the same plane as the projecting surface, its contrast to the highlights on the screen is considerably reduced.

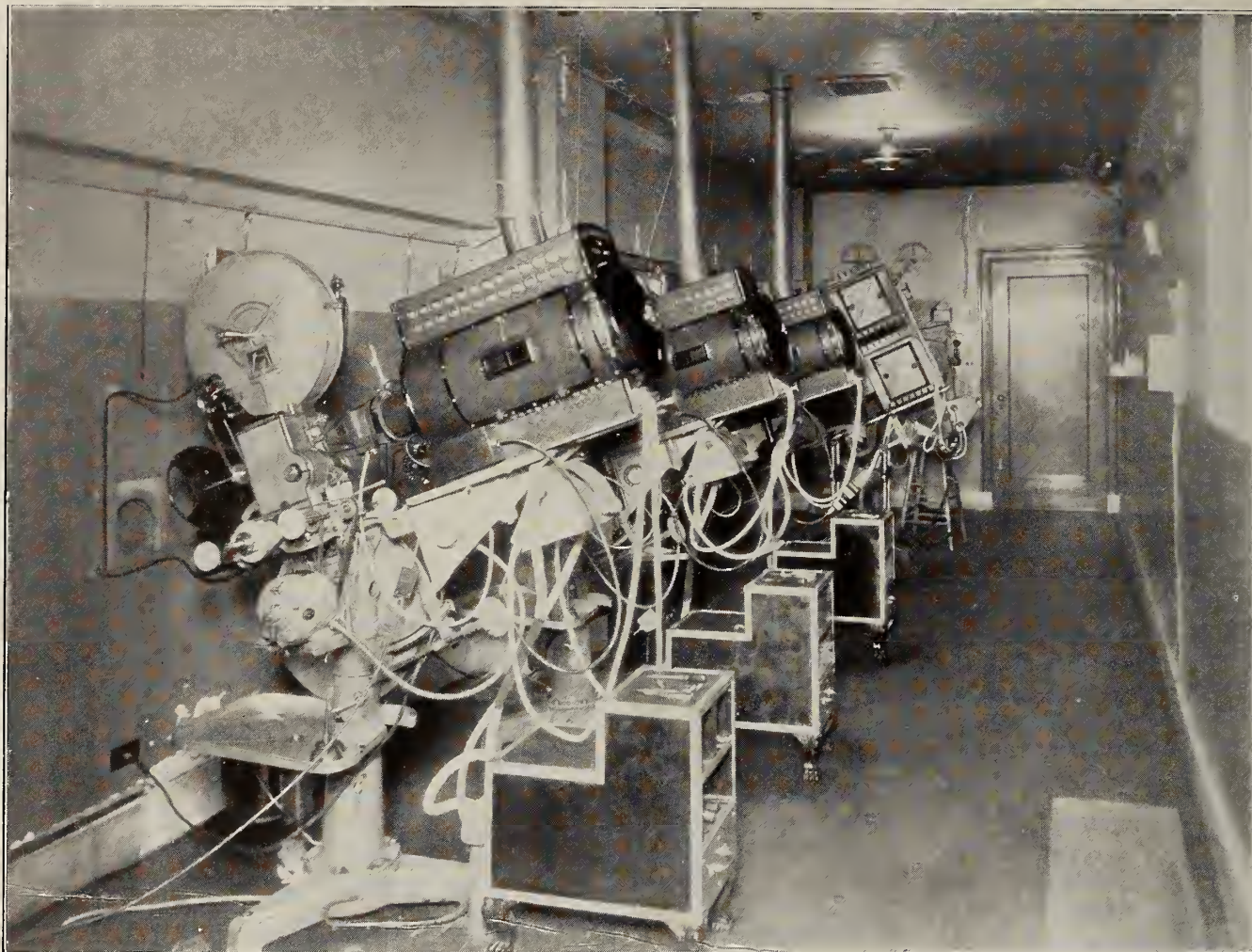
This method of mounting the screen has decided advantages over any other that the writer has observed under actual theatre projection conditions. Reducing the contrast between the screen and its background naturally lessens the strain on the eyes, but the luminous deep blue backing is in itself inconspicuous and does not fight for the attention. As a matter of fact the background appears as space, with the screen as the only object to command the attention of the eye.

There is another advantage in that the screen is "staged," as it were. The picture is set off by itself, occupying the center of a setting in which everything is subordinated to the central object.

Thus with a remarkably simple arrangement the most objectionable features of "masking" are almost entirely overcome.

The matter was seriously taken up some time ago and experiments conducted in Keith's Palace Theatre, New York. Perhaps Projectionists all over the country will be interested to know what we finally succeeded in doing there.

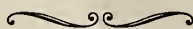
We have accomplished another thing also besides reducing the eye-strain. With this new way of hanging the screen, patrons can enjoy the picture just as well from any point in the balcony as they do now in the front rows. What is still better, we have had patrons come and tell us so.



A Complete Projection Room

THE E. F. Albee Theatre, De Kalb Avenue, Brooklyn, recently re-equipped its Projection Room as above. It is complete with every proven device for perfect projection and for the comfort of the Projectionists. The size of the room, the color of the walls and ceiling, the floor covering, the ventilation facilities—everything necessary to a well laid-out Projection Room is found here.

H. H. Stoll is Supervisor of Projection for the Keith Theatres and he is responsible for bringing projection in all Keith theatres up-to-date.



*Photographs of the finest projection rooms in the country
will be a feature in this paper monthly.*

Projection- *Yesterday, Today and Tomorrow**

By ARTHUR H. GRAY

(Lancaster Theatre, Boston, Mass.)

A present day survey of the art of motion picture projection in the field of theatre presentation provides plenty of evidence that the art is now gradually being accorded the recognition which it rightfully deserves in the general scheme of things in the film industry. It is true that the evolution has been painfully slow and snail-like, and to those employed in the craft who have had its interest at heart there have come, during the past decade, many disquieting and discouraging moments in which the thought uppermost in mind was whether or not the game they had selected to play as a means of livelihood was worth the candle.

Indifference

Frankly, the writer has never been able to understand just why the industry as a whole has, for so long a period of time, maintained such an apparent indifference to the development of an art which bears a most important and vital relation to the welfare of everyone connected with a production, from its conception to its final projection.

Secondary Importance

The old saw, that, "a chain is no stronger than its weakest link," seems a particularly appropriate simile to this case. The thing is so perfectly obvious and has been clearly presented so many times that any further reiteration seems needless. It is a matter of common knowledge to those who have interested themselves in the situation that projection, with the exception of a relatively few cases, has consistently been accorded a position of secondary importance in the presentation of a picture. Happily, this condition is slowly but surely undergoing a process of change and it is quite within the realms of probability that the future standard of projection will be quite beyond the capabilities of the general average of projectionists now engaged in the work.

First Requisites

Projection, in its origin, was suddenly launched forth as a new art without any existing similar field of endeavor from which to draw trained workers. Just what constituted projection and the qualifications of the "operator" was a matter for conjecture. The apparent requisite qualifications of the early motion picture

CEMENT

WHEN applying cement to splices it is advisable to avoid the use of more than is absolutely necessary to fully cover the scraped surface. Film cement plays a very important part in the making of good splices, for it is film cement that actually makes the splice. Other procedure is only properly preparing the film to receive the cement. If too much cement is used it will soften or break down the whole celluloid base instead of only the surface and will result in a cupped or buckled splice which is as bad as a splice which is mismatched or out of register. Therefore, it is very important to use the proper amount of cement and to use it quickly. Film cement evaporates very rapidly and the constant opening and closing of cement bottles throws the mixture out of balance in which condition it is very apt to cause a bad splice. Unused or old cement should not be used and in no case should fresh cement be mixed with old cement.

operators were a certain amount of mechanical skill, a sketchy grounding in electrical knowledge and a disposition and temperament which defies description. The latter must be a heritage, inasmuch as the projectionist's penchant for peculiar craft traits and idiosyncrasies is quite definitely established even at this late date.

Formative Stages

Of course, in the beginning, conditions were in a general chaotic condition as they invariably are during the formative stages of any great industry, but, nevertheless, projection has progressed much more slowly than any of the other allied arts until within a comparatively very recent period. Now, projection is beginning to come into its own and the demand for real skill in the projection room is making itself felt.

Inherent Talent

The qualifications for an expert projectionist, as the art is being practiced today, is a peculiar and not too common combination of mechanical aptitude, a high degree of technical knowledge and a certain inherent talent for projection, itself. A projectionist may have a high degree of mechanical skill, he may be an expert electrician, he may have the basic knowledge of physics necessary for the intelligent solution of his many current and recurrent technical problems, he may be furnished with the best projection equipment that money can purchase, the conditions under which he is working may be perfect for expert screen results and, yet, unless he possesses a peculiar and intangible aptitude for the art of projection, itself, his results on the screen may be colorless and commonplace despite their theoretical perfection.

Personality in Projection

I have often challenged the statement that the personality of the projectionist cannot be built into his projection. It absolutely can be, providing he possesses the ability to do it. I do not mean to say that we can go into a theatre employing two shifts of projectionists

(Continued on page 30)

Twenty Years Ago

By EARL J. DENISON



TWENTY YEARS ago the average theatre consisted of a storeroom with a few hundred chairs, a white sheet at one end of the room for a screen and a booth at the other end for the projection machine. Frequently this booth was of plain wooden construction and unlined in any way with fireproof material. Often they were so small the operator could barely squeeze in alongside his machine, and, in many cases, the height of the booth prevented him from standing erect. The equipment generally consisted of one projector with a stereopticon attachment, and in a great many cases without top and bottom magazines or motor drive, etc. Alternating current was generally used and the average throw was about seventy-five feet. The speed of projection averaged about sixty feet a minute, with plenty of flicker both from the shutter and the synchronization of the shutter with the alternating current. At that time there were no long feature-length pictures. Operators were generally recruited from the ranks of electrical workers. Projection as a whole was very bad.

It was not uncommon to find the combinations of the objective lens out of position, and where direct current was used oft times the arc was found to be burning upside down. The material used for screens, in many cases, was plain white muslin and the picture could be seen from one side as plainly as the other.

The average admission price was 10 cents for a two to four reel show with an illustrated song, and still the people went to the motion picture shows.

It was held as great progress in the manufacturing of projectors when motors and magazines were added and when the booths were enlarged sufficiently to permit the installation of two (2) projectors. No such thing as a spotlight or "effect machine" was thought of as projection booth equipment. The opening of hundreds of theatres throughout the United States, from the

smallest hamlet to the largest city, resulted in certain improvements and refinements in projectors and projection room equipment. From the two machine installation things gradually progressed to the addition of a dissolving stereopticon and in certain theatres showing vaudeville a spotlight in the booth.

The above is an old story and familiar to thousands of people in the motion picture industry, but it is necessary to retell it in order to emphasize the progress made.

The word "booth" has long been obsolete and a recent visit to the projection suite of the new Paramount theatre, Times Square, New York, inspired this article. In this magnificent temple of the motion picture "the projection suite" consists of the projection room proper, rewind room, repair room, rheostat room, private lavatory and showers for the projectionists. It would almost be impossible for the laymind to conceive the vast amount of equipment in this projection suite.

First there are three (3) projectors of a well-known make with all the latest improvements and attachments, including high intensity arc; two spotlights, one effect machine, one flood lamp, one dissolving stereopticon. All machines are equipped with tachometers. An absolutely fireproof safe is installed in the wall between the projection room and rewind room. Here we have not only thousands of dollars invested in equipment, but we also have six rooms devoted exclusively to the projection of the picture. We also have the comforts and conveniences necessary for the projectionist's welfare.

Twenty years is a long time. It is also a tremendous jump from a \$100 projector in a tiny coop or booth to the above described projection suite. Not only has there been great improvements in equipment and projection rooms, but there has also been tremendous improvement in screen results.

RHEOSTATS

By

J. H. HOFFMANN



OVER five years ago the writer, in collaboration with Mr. J. E. Soons who succeeded him as Chief Electrician of the old Precision Machine Co., Inc., manufacturers of the Simplex Projectors some years previously, decided to develop the present type of Perfection Rheostats as now manufactured by them since, and which are now in use in practically all of the foremost theatres to-day, such as the Roxy, Paramount, Keiths, Loews circuits and many others, having proved the correctness of the original design after continuous service.

This rheostat as no doubt most of the foremost Projectionists who have been using them for several years have realized the difference in the advantage of the multiple coil construction over the old cast grid series type of rheostat both as to absence of repairs and the continuity of operation possible even were several coils to fail for any reason.

At the time of the writer's entrance into the game, the type of rheostat used at that time, which was of the series grid type and had a capacity of 25 Amperes fixed, would certainly not be tolerated today.

No doubt many of the old timers still recollect them. Shortly after realizing the need of higher current values as the length of throw, having increased, as the movies were beginning to get out of the converted store stage, into a theatre building of its own and considered quite luxurious in its projection equipment of one hand-driven projector, in a transite coop hung from the ceiling over the head of the audience in which the Projectionist of that day was expected to spend his waking hours and often times using the rheostat of that day for his cook stove, etc. which no doubt many of the old timers still remember. It was decided by the officers of the Simplex Company, viz. the late Mr. Frank Cannock, Mr. Jos. E. Robin who was at that time Sales Manager and who was one of the foresighted pioneers, to develop a rheostat which would be adjustable and was to have a range of 20 to 40 Amperes as this was thought to meet conditions for some time to come; however within the next year it was decided to increase these values to a range of 25/50 Amperes and this served its purpose fairly well, but at times had the electrical department swamped with repairs.

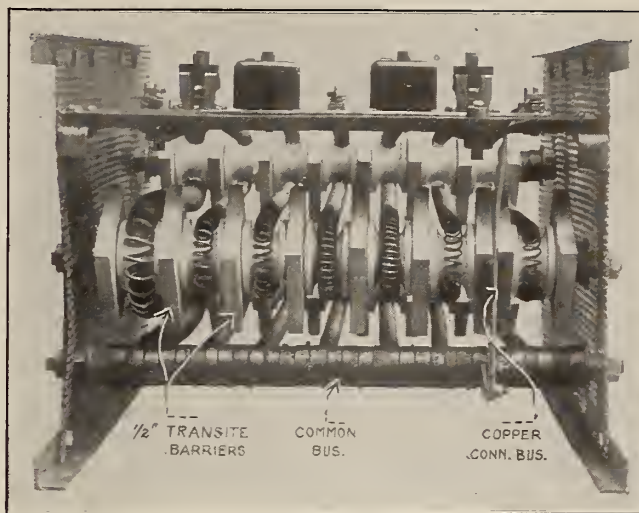


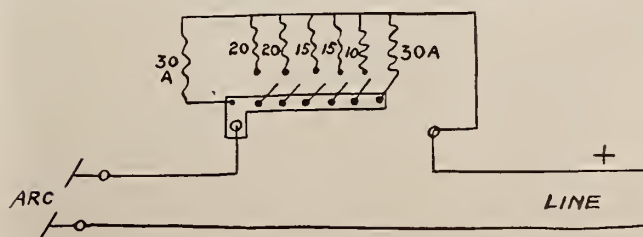
Fig. 1

Along about 1913 or 1914, came that Master Showman "Roxy" to take charge of the Regent Theatre and demanding higher light values and it was finally decided to redesign the rheostat with a maximum of 65 Amperes which served well and was considered the last word, until the opening of the Strand Theatre with Roxy again in charge and who demanded still more light, and we were called upon to furnish rheostats with a maximum of 90 Amperes which caused the writer to again redesign the existing rheostat and which served well as many of the boys who were on the road with the Birth of a Nation can still recall.

These still had their faults and realizing the many disadvantages viz: frailty of grids, high operating temperatures, causing disintegration of Mica insulating tubes, pitting and burning of contact shoes and buttons, crowding of the heat space into a smaller area with increase of current, etc., it was finally decided by Mr. Soons and myself to discard the present practice of the day and late in 1921 the firm of Hoffmann & Sons was formed, and we immediately proceeded to design a rheostat that would eliminate all of the old faults and be as fool proof as possible, how well this has been carried out, all of you boys who have used them both on the road and in the leading theatres can attest.

As no doubt all of the readers are familiar with the purpose of a rheostat, I will not go into this phase of it in this article, but shall endeavor to describe the construction and operation of the Perfection rheostat.

This rheostat is of the multiple coil type, (see diagram below of 60/140 Amp. type) using a special alloy wire having a high percentage of chromium, properly aged before use which makes it the only rheostat we know of which will deliver its rated current values throughout its life, (which we do not know, as the first one sold is still in operation after over 5 years service).



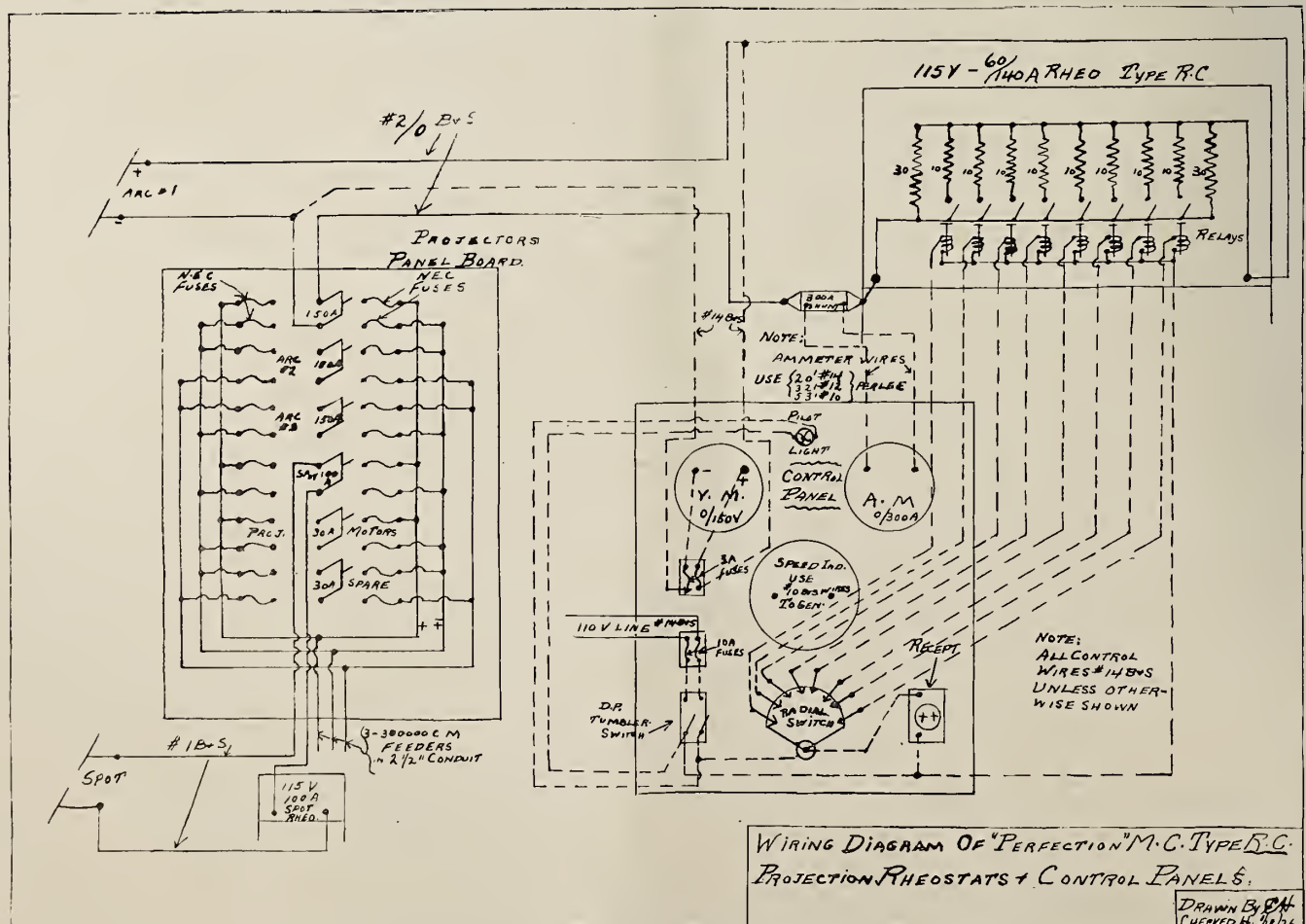
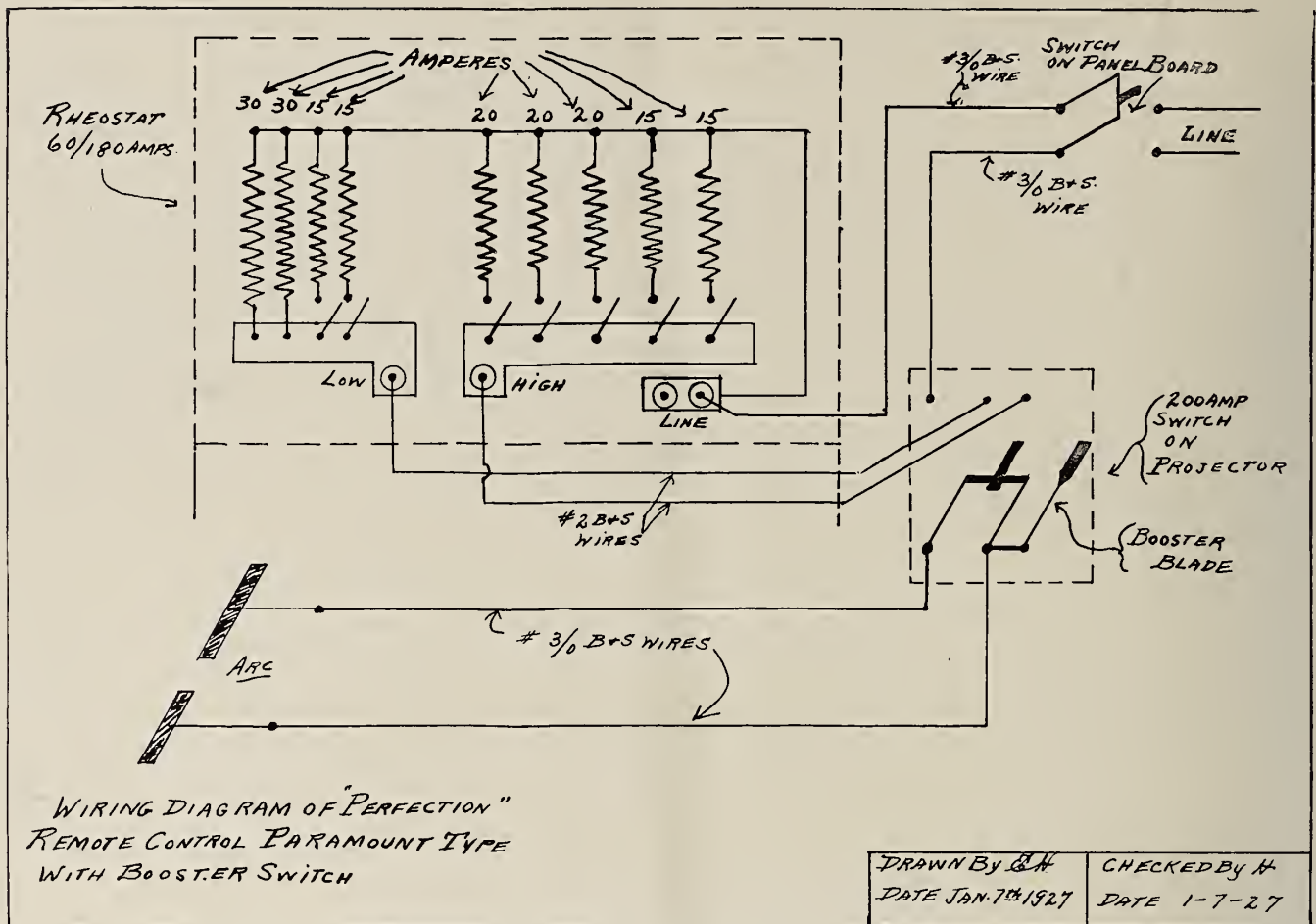


Fig. 2 (Top). Fig. 3 (Bottom)

The coils mounted on special porcelain knobs rigidly held between $\frac{1}{2}$ " Special heat resisting Transite Barriers, which keeps each coil in its proper place, the use of any asbestos wire, is eliminated by the use of a copper bus between terminal board, and common coil bus, which is insulated from the frame by 85% Mica tubing over $\frac{1}{2}$ " Steel Rod and 100% Mica washers. (Fig. 1)

Each rheostat is tested with a Megohmer for insulation resistance when completed to insure against any defects which might develop in the process of manufacture.

The switches used for cutting in or out of coils are of the quick break Push Button type double pole in parallel and are used at 20% of their rated capacity which insures a long life, in fact everything entering into this rheostat is oversize and is the reason of its long life and overload capacity.

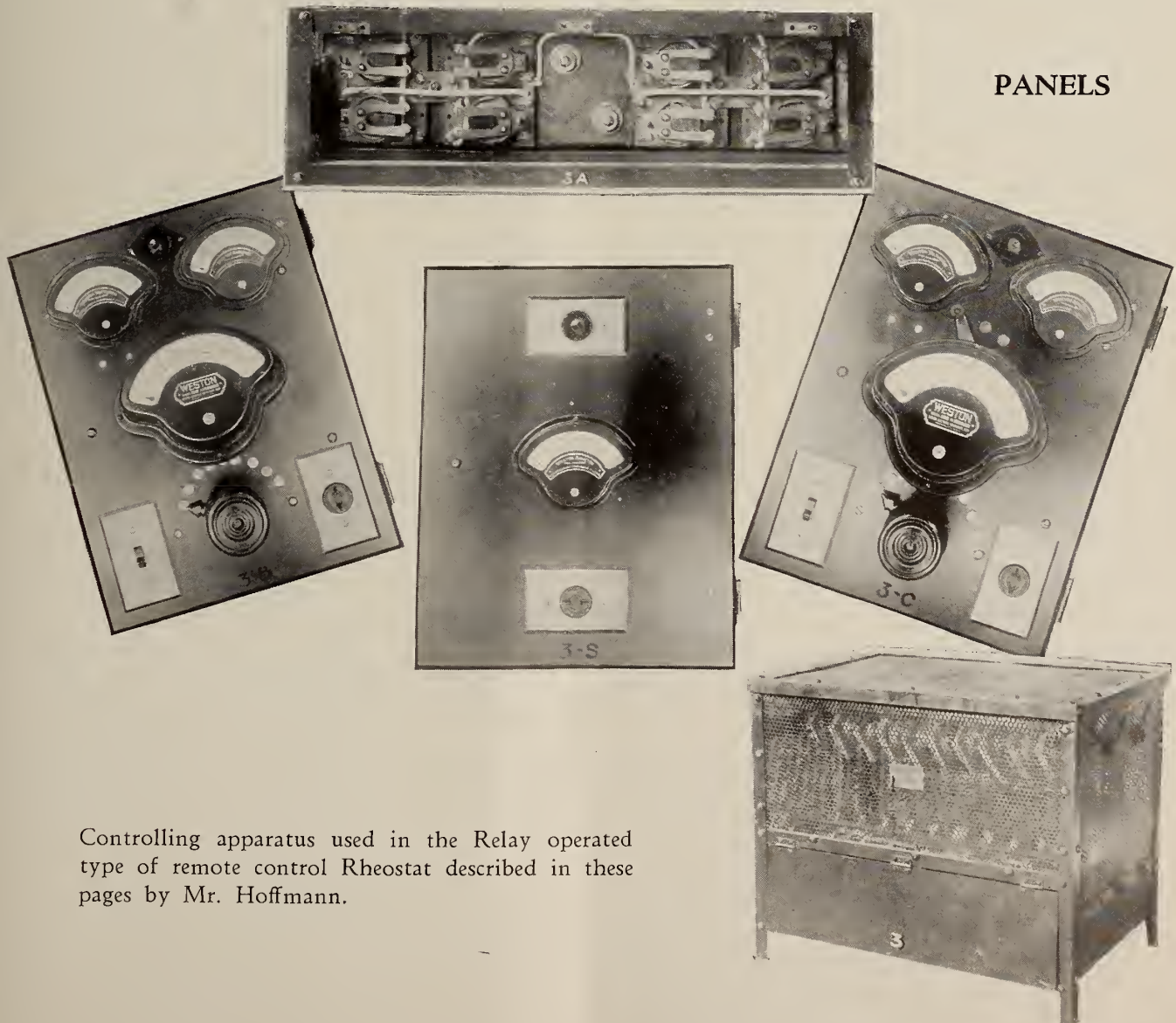
In the Paramount Theatre, Roxy, Loew's State and others we have developed a type of Rheostat (see diagram Fig. 2) in collaboration with Mr. Harry

Rubin, Chief Projectionist of Publix Theatres, which we believe is absolutely fool proof and flexible as this can be set for any striking values between 60/90 Amps. and an additional adjustment of 90 Amps. for high or a total of 180 Amps., operated by a booster switchblade in one box with projector switch which are also manufactured by us.

We have also recently developed and installed in several theatres in this city and are now equipping Keith's New Theatre in Boston and others with a Relay operated, type of remote control rheostat, as well as the Panels which are shown below (see wiring diagram Fig. 3) which we believe to be the most flexible and perfect control system devised to date and is after 2 years of daily operation in perfect condition.

These are certainly great strides attained in the past fifteen years and we are proud to have been instrumental in some of these strides forward.

We would certainly appreciate any comments from Projectionists that will help us.



PANELS

Controlling apparatus used in the Relay operated type of remote control Rheostat described in these pages by Mr. Hoffmann.

MOVIETONE

By

JAMES R. CAMERON



The Fox-Case Corporation is responsible for the introduction of the "MOVIETONE." The system was developed by Theodore W. Case in the Case Research Laboratories in Aubin, N. Y.

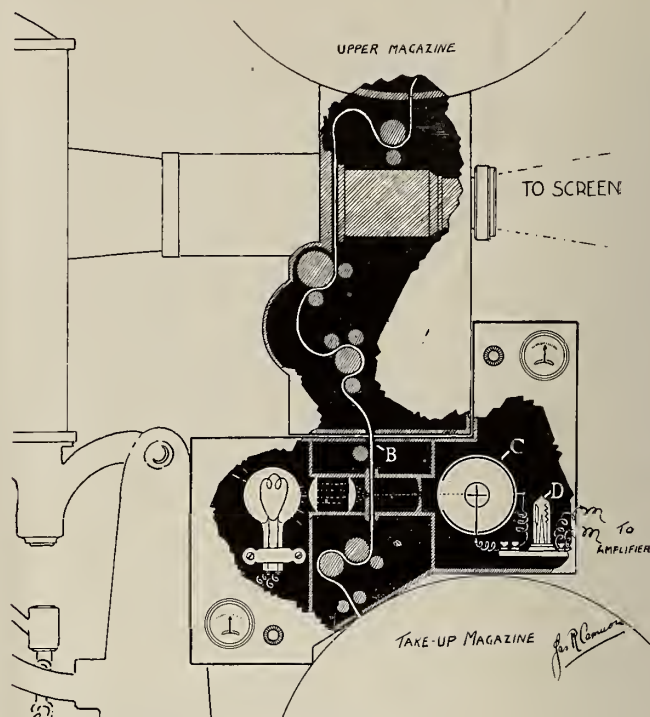
THE Movietone pictures are made in New York at the Fox Studios. These studios are of special construction and embody the finest engineering practice of today from the standpoint of acoustical conditions, ventilation (which is an all important one in a studio making talking movies) and adaptability to the purpose for which they are built. There are two rooms or studio stages in which production can go on either separately or simultaneously as is found necessary. Both studios are ample in size to allow for elaborate settings or large orchestral accompaniment, both studios have the usual equipment of lights, etc., used in the making of motion pictures as well as the special apparatus required by the Movietone process.

The walls of these rooms are absolutely sound proof, so that it is possible for outside noises to penetrate either room while a picture is being taken. In order to secure this complete isolation, each of the studios is enclosed within a double wall. These walls are slightly over one foot in thickness, including an interior air space of six inches. On the inside of the studio walls are hung heavy draperies of a sound absorbing nature, similar draperies are stretched across the roof of the studio. By this means, perfect acoustic conditions are obtained.

Aside from the fact that absolute silence is enjoined on all present, the production of a Movietone picture does not differ greatly from the ordinary motion picture production of a similar subject. The settings are constructed and lighted in the same way, and a rehearsal is held before the actual picture-taking, such as is done in ordinary picture making. While the action in a Movietone rehearsal is being checked up by the director sitting behind the camera, the vocal director in another room, checks up the tonal quality through the simple device of a loud speaker connected with a microphone in the studio.

The operation of the system is as follows:

The sound is picked up by a high quality microphone, at present using the condenser transmitter developed by the Western Electric Co. After amplifying through four stages of amplification, the amplified sound is impressed upon a special light known as the "aeo" light. This light has the property of being very actinic and will respond accurately to impressed electrical variations.



A View of the Take-up Magazine with Movietone

This accuracy of response is due to the incorporation of alkaline earth oxides on the cathode.

This "aeo" light constitutes one of the developments of the Case Research Laboratory. Previous to this, attempts had been made to record sound, using a gas discharge device maintained luminous on a high frequency discharge. This arrangement, however, was unsatisfactory in that it did not give sufficient light and could not be modulated correctly.

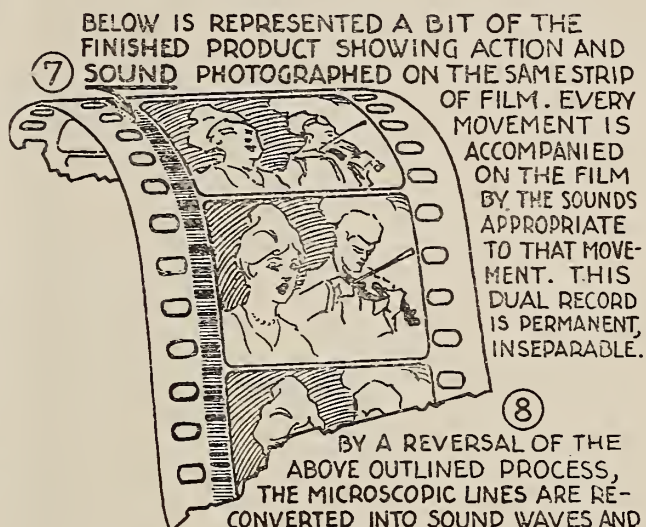
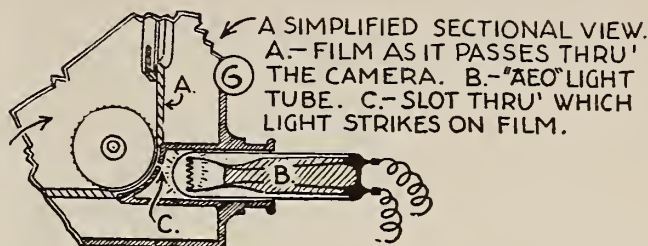
In the Movietone system, the picture and sound are taken in the same camera. The sound is applied to the film at the point where the film is in contact with the feed sprocket. In this camera, precision gears have been installed between the shutter shaft and the sprocket shaft. The sprocket itself has been cut to an accuracy of better than .0001" in eccentricity. With this precision working, it is possible to obtain the uniform velocity of film necessary for accurate recording. The sound is applied to the film at a point adjacent to the sprocket holes and cutting off approximately 1/10" from the picture. The sound is printed at this point through a slit or aperture 1/10" long and .0008/10" wide.

The design of the sound aperture or slit is one of the big factors in the success of this system. Previously the sound has been recorded through slits formed by metal jaws, but trouble was experienced with the slits filling up with dust and dirt. Further it was impossible to machine the slits sufficiently accurate to obtain good recording, even though the film was held in intimate contact with the slit. In the Movietone system the slit is produced by ruling an aperture on a piece of silvered quartz. A cover glass is then cemented to this quartz and the cover glass is then polished down to approximately 1000th of an inch in thickness. Under these conditions the film is not touching the slit, but due to the lense effect of the quartz, practically no spread in the light is experienced. The cover glass, of course, solves the problem of the aperture becoming closed due to dust or dirt.

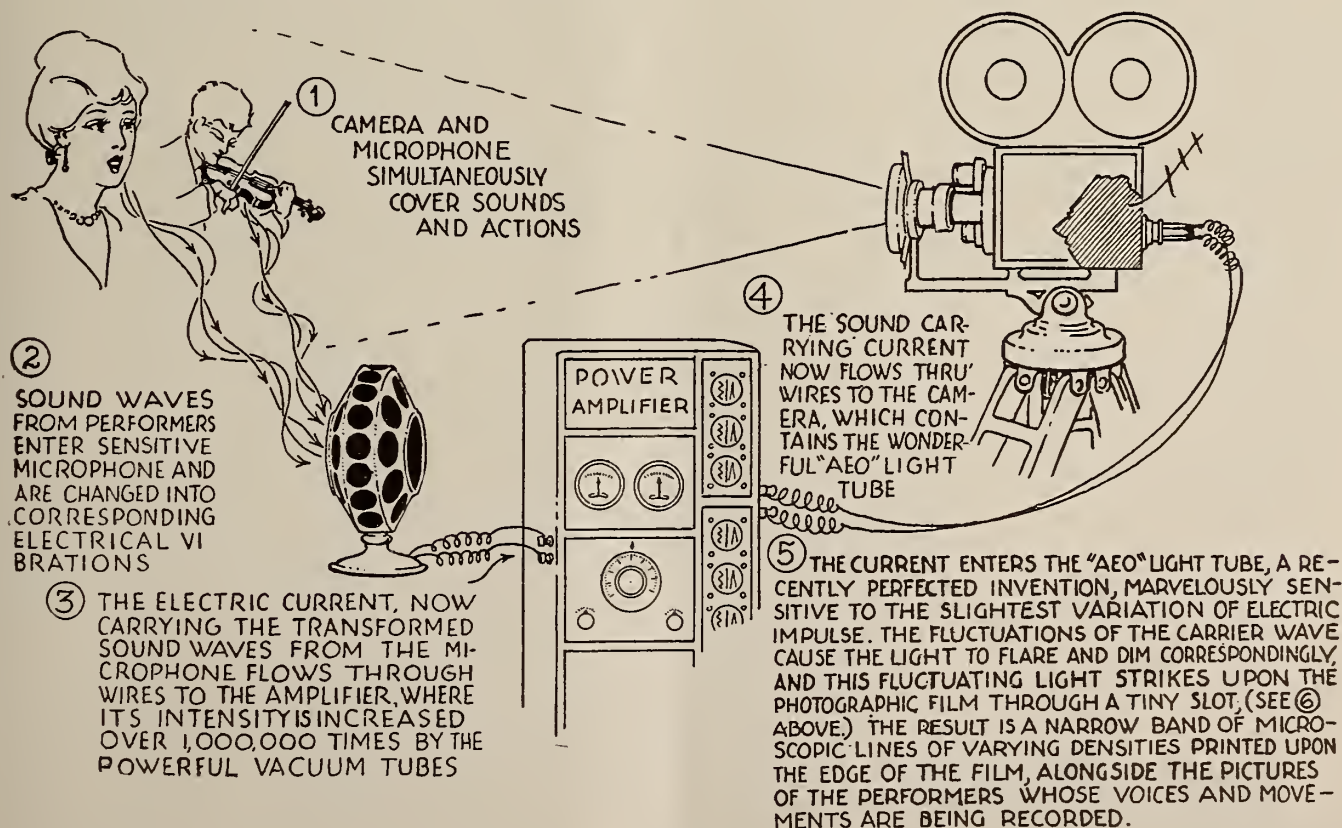
The camera is driven by a synchronous motor and in this way it is possible to use as many cameras on a shot as necessary, without having trouble with the synchronism. In designing the camera, care has been taken to keep it noiseless in operation.

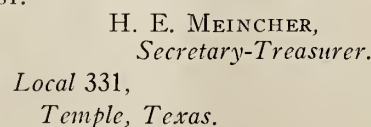
In the camera, the distance from the centre of the picture to the corresponding sound below is $7\frac{3}{4}$ inches. The film is developed in the usual way, preferably in a slow working developer. At present, printing is done on a continuous printer, running through once for the sound and once for the picture exposure. The printer prints the picture with reference to the sound so that on the positive the difference between the picture and corresponding sound is $14\frac{1}{2}$ inches.

The attachment for the projector for reproducing the sound film was designed to apply to the standard projectors in use to-day. It is applied below the head by fastening to the main casting and lowering the take-up magazine. This attachment consists essentially of an accurate sprocket on a shaft with a large fly-wheel to give uniform velocity to the film. A 25 watt straight coil filament lamp, fed by means of a high quality lens system upon one of the special slits, similar to the one described above and used in the camera. As the sound waves pass the slit they cause variations in the light. These variations fall upon a barium photo-electric cell which changes the light variations into electrical variations. These electrical variations are amplified and come out as sound through the loud speakers, which are placed behind the screen. The speakers are placed behind the screen so that the illusion is perfect and it is impossible to localize the source of the sound. In order to be able to do this a special screen was developed which has sufficient reflective power to give a good picture and still is perfectly transparent to sound, this is due to oblique openings in the material of the screen.



BY A REVERSAL OF THE ABOVE OUTLINED PROCESS, THE MICROSCOPIC LINES ARE RE-CONVERTED INTO SOUND WAVES AND PROJECTED THROUGH A LOUD SPEAKER SIMULTANEOUSLY WITH THE PICTURE SHOWN UPON THE SCREEN. REPRODUCTION IS ABSOLUTELY AND AUTOMATICALLY SYNCHRONOUS.





More Comments By Our Readers (See Page 32)

Boston, Mass.,
Nov. 17, 1927.

MR. J. H. DAVIE,
45 West 45th St.,
New York, N. Y.

Yours of recent date at hand and contents noted. I took the liberty to read the copy of The Motion Picture Projectionist that you so kindly sent me and after passing it around to the Members it was voted to endorse your Paper and its Objects.

So kindly forward 150 Blanks so as I may be able to forward back to you 100% subscriptions.

Sincerely yours,

JAMES F. BURKE,
Secretary,
Business-Agent,
Local 182.

Very enthusiastic with the realization that finally our craft merits the enjoying of a journal published for it. Your first copy spells, SUCCESS in capital letters and promises as lively a magazine as I have encountered.

LEWIS ZIMAN,
Secretary.

Local 62,
Colorado Springs, Colo.

The magazine is well worth the subscription.

WAITMAN E. FURBEE,
Secretary.

Local 270,
Clarksburg, West Va.

(Special by Radiogram)

We wish to congratulate you on the excellence of THE MOTION PICTURE PROJECTIONIST and hope to enjoy many more good articles.

TOM McNAMARA,
CLARENCE GLEASON,
ANGELO KAKIS,
ERNEST JAMES.

Local 505.

The boys like the PROJECTIONIST very much.

J. H. WALLACE,
Secretary.

Local 337,
Utica, New York.

It is indeed a fine magazine and everyone should subscribe for it.

JOHN R. WALLER,
Local 473,
Wilmington, Delaware.

I am glad to inform you that at our regular meeting held yesterday I was able to get the entire membership to subscribe to your paper. Needless to say we are all anxiously waiting for the coming issue.

HUGH J. SEDGWICK,
Secretary.

Local 303,
Hamilton, Ontario.

Ours is a mixed Local but the Operators have subscribed 100 per cent.

E. L. GULLATT,
Secretary.

Local 568,
Columbus, Georgia.

First: I want to compliment you on your paper.

Second: I am interested in your advertising and also ask you to send me a rate card.

Third: I believe that you are calling it to the attention of the men who have a great deal of influence in the selection of MOTION PICTURE equipment for the theatre. Incidentally, the writer owned and controlled several equipment supply houses in the state of Ohio in the past, dating back as far as 1910.

During this time I have been in constant contact with the projectionists, myself being an old operator as well.

LEO E. DWYER, Pres.,
National Screen Co.,
Cleveland, Ohio

I am inclosing subscriptions for the MOTION PICTURE PROJECTIONIST which is in my mind the best publication ever offered to the men engaged in the craft. I hope to be able to send in subscriptions for every member of this local.

E. HOLZ,
Secretary Local 224,
Washington, D. C.

Herewith are subscriptions. If the first issue is any indication of the future possibilities of your publication then I feel confident that it will be an instantaneous success and very beneficial to the craft. Assuring you of our coöperation and with very best wishes, I am

R. RANSELL,
Secretary.

Local 170,
Kansas City, Mo.

I think it is a wonderful magazine with lots of good hints.

B. EDGAR,
Secretary Local 324,
Albany, N. Y.

I was very much pleased with the first issue and hope the succeeding ones will be as interesting.

HENRY McNAMARA,
417 Dawson St.,
Sault Ste. Marie, Mich.
Local 435

Picture Projection on a Business Basis

By LESTER B. ISAAC

Chief Supervisor of Projection, Loew Theatres, Inc.

ON July 19th, 1926, the Loew Projection Department was put on a sound business basis by the executives of Loew's, Inc., and we can proudly say it is a real department now. After a great deal of hard work and plenty of patience, we are now maintaining a system which has heretofore been unknown in the industry.

For instance, when the plans are first drawn for one of our new theatres, the attic and longitudinal cross section plans are turned over to the projection department, together with the electrical specifications. We then make a blue print drawing of the layout and design



LESTER B. ISAAC

of the projection room. Then we make a complete wiring diagram showing the correct size and location of every wire, conduit, outlet and electrical appliance as well as complete wiring diagram of projection room lighting. In this diagram we incorporated our standardizations, such as projection room powers panel, designed in such a manner as to permit of the operation of both generators at the same time. This permits us to practically operate all of the equipment in the room at once if necessary, with the assurance that we need fear no undue overloading of the generators. This also permits us to change over from one generator to the other, without the slightest interruption to the show in case of an emergency.

In the event that the electrical specifications do not meet with our approval, we rewrite them in such a manner that they will incorporate the above named standardizations. When we have completed our drawings and specifications, we forward same to the architect, which relieves him of all responsibility as far as the correct design and wiring of the projection room is concerned.

Our next step then is a general checkup on projection room just before it is completed. Then the installation of the above named equipment, and on the opening night, personal supervision of the first show. From this time on the theatre is entered in the files, and subjected to the same rigid inspection that all the other theatres are subjected to.

In the office of the projection department we maintain a complete filing system in which are entered the name of every theatre, Projectionist and manager working on the circuit. Also there is a complete list of every piece of projection equipment in every theatre. This information we obtain by forwarding a questionnaire to every theatre which they are required to fill out and return to this office.

All projection room equipment and supplies are purchased by this office. A complete and concise record of every part or accessory used in the projection room is kept and by referring to this filing system, we can at any time accurately determine the exact price, date or reason for purchasing same.

We have standardized on our projection room equipment, and we are about to form a projection club for our Projectionists, exclusively at which we hope to see the various manufacturers and dealers present to us in the form of lectures, any and all equipment which they may be making or selling.

CLEANLINESS

IT is absolutely necessary to maintain perfect cleanliness at all times in handling the film. As is well known, the emulsion side of the film picks up every particle of dust and dirt it comes in contact with, and is the cause of a great deal of scratching. In passing through the projector the film gathers more or less oil. The oil mixed with the dust and dirt forms a gummy substance that not only scratches the film but fogs the picture to such an extent that the screen results are greatly impaired.

Keep the Projection Room tables perfectly clean and orderly at all times. Cleanliness is a safe guard to good health. Keep the inspection room well ventilated.

"Better Inspection Makes Better Projection"

By J. H. KEENER

Local 333, Charleston, S. C.

I ENCLOSE a label and some stickers that the Projectionists of Charleston are using. We printed them in an attempt to get the Projectionists of our territory to inspect the prints of the pictures that they use. You will notice that our stickers are a warning not to "punch holes" or put paper on the ends of a part. Other stickers call the attention of the operators to means that they can take to reach our goal of better projection.

I am glad to say that the Projectionists of Charleston inspect every print that they use; every splice is looked at. We screen our shows in the morning of the opening day. If a print looks bad at first glance and if we have the time to do so, we screen it early for examination.

Our projection machines are always in first class condition and we order at once any part that we may need.

I also send you a report that the Projectionists use when a print comes in to us in poor condition. We make out three copies: one we send to the exchange, one is given to the manager of the theatre, and the other is kept by the Projectionist. I have a few in my files that I should like the officials of the film companies to see. I do not say that this system of reports has brought us better prints, but it does show the film companies how the prints reach us and it also shows them that the Projectionists of this Local are working for better projection.

I think that a good slogan to start would be, *BETTER INSPECTION MAKES BETTER PROJECTION*. Everything that goes into the making of a picture can be first class and the theatres can be the best, but if the print is bad, we cannot give good projection. We take pride in our work and the film companies should coöperate with us.

I send these labels to you because we thought that you would like to bring them to the attention of other Projectionists through your magazine, *THE MOTION PICTURE PROJECTIONIST*. If the film industry would stop to think, it would realize that no matter how much they spend on a picture for mechanics and sets, in the final test they must depend on the Projectionist. He is the last man to handle the prints and he is the man that puts them before the public.

International Alliance of Theatrical Stage Employees and Moving Picture Machine Operators

OF THE UNITED STATES AND CANADA

Affiliated With American Federation of Labor
Local No. 333 Charleston, South Carolina. Chartered March 27, 1911

Affiliated With South Carolina Federation of Labor
Central Labor Union of Charleston, S. C.

CHARLESTON, S. C.

PROJECTIONIST'S REPORT

Exchange _____

Address _____

WAS RECEIVED IN THE FOLLOWING CONDITION

Reels _____

Bands _____

Sprocket Holes _____

Splices _____

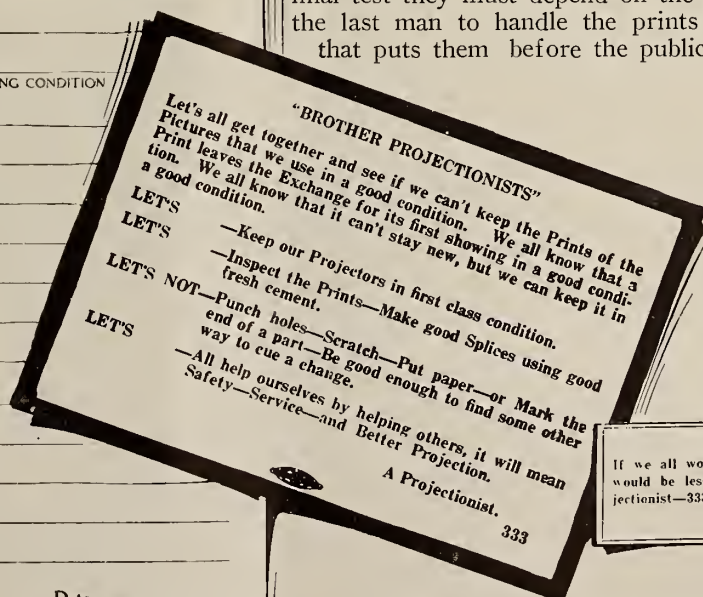
Remarks _____

Inspected by _____

Inspected by exchange inspector _____ Date _____

Projectionist.

(OVER)



"Reminders" to
Local 333 members
to keep prints in
good condition.

If we all would inspect our Prints, there
would be less inspection for all—A Pro-
jectionist—333.

Form used by members of Local 333 for complete report
on film received at the theatres to stimulate effort for
better prints.

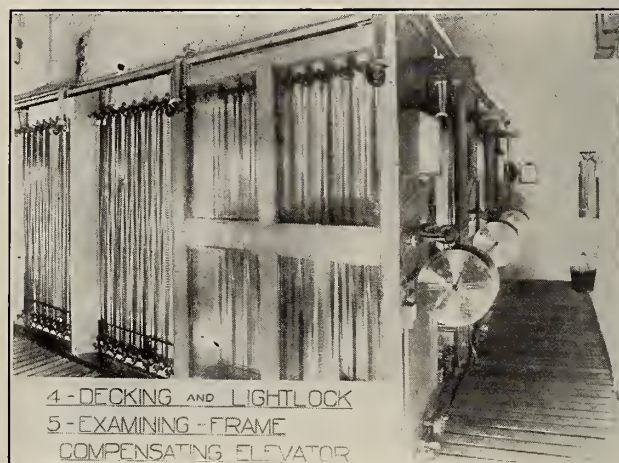
Developing Film in a New Way!

By R. MERRITT LACEY

THE automatic developing machine shortly to be marketed is a time and labor saving device created to facilitate and make more efficient the laboratory branch of the motion picture industry. Not only does this machine eliminate a great deal of space, time and men in the process of developing and drying film, but it effects saving in other departments also. To begin with, films may be printed in rolls of 1000 feet instead of the customary rolls of 200 feet or less. This eliminates the constant handling of the film by the printing room girls and likewise the threading and re-threading of the printers.

When the printed stock is first received in the developing room, it is placed upon the supply spindles on the developing machine in rolls of 1000 feet each. Leaving the supply spindle, the film is carried over a compensating elevator before entering the developing tubes. The purpose of this elevator is to permit continuous running of the machine, so that when one supply spindle is emptied and the film at that point stops, the rest of the film on the elevator continues to feed the machine allowing the operator a minute or so to make a splice from the last of the film on the first supply spindle to the first of the film on the second spindle. These splices are made with little wire clips and can be affected in less than ten seconds.

The development of the film is a process of carrying the film up and down through a series of pyrex tubes. Throughout these tubes the developing chemicals are automatically circulated from and through a common storage tank where the exact temperature and strength of the developer is maintained at all times. The develop-

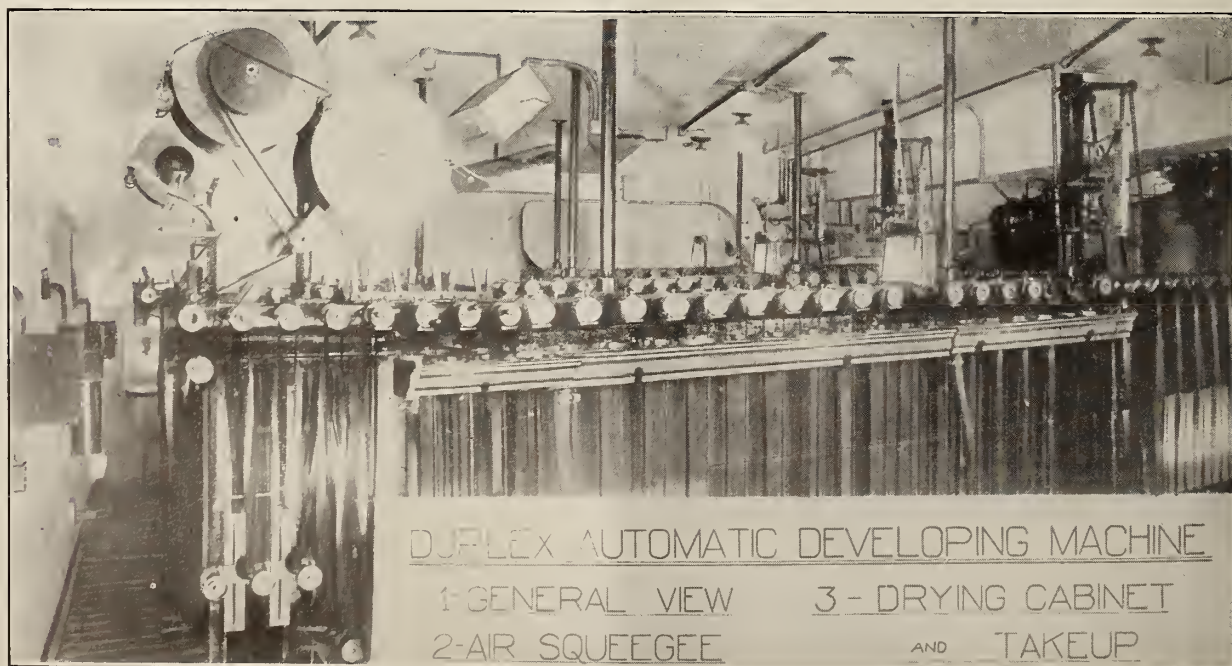


4-DECKING AND LIGHTLOCK
5-EXAMINING-FRAME
COMPENSATING ELEVATOR

ing solution in the developing tubes therefore, is always correct both as to its strength and to its temperature and never varies day or night, winter or summer.

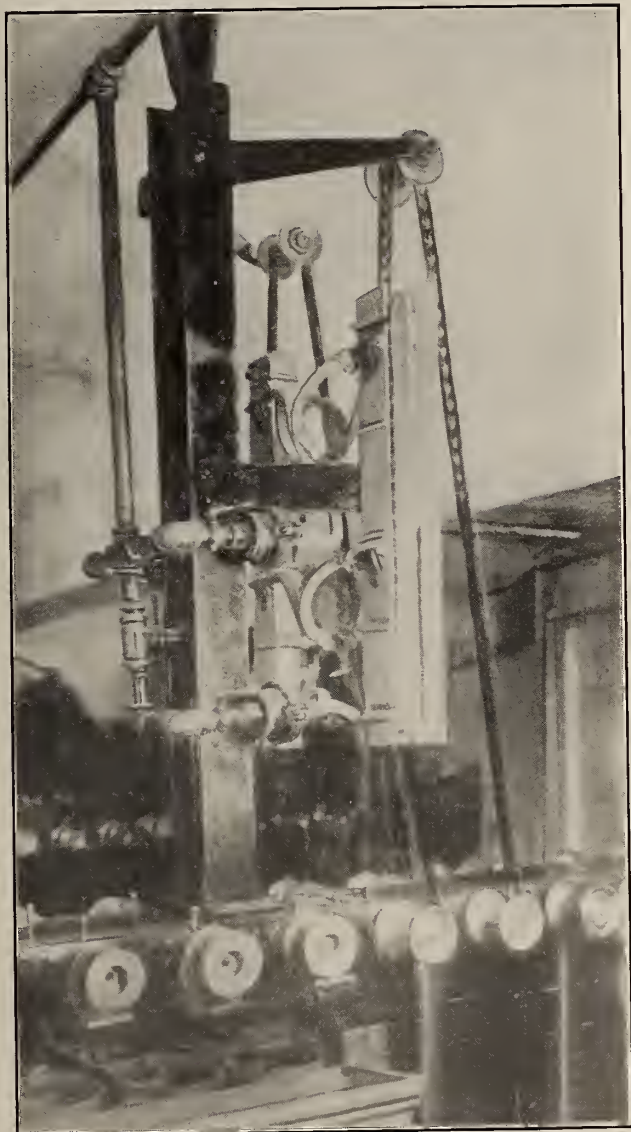
Leaving the developing tubes the film is carried through a similar series of tubes the first of which is a cold water bath, and then a series of hypo tubes. In the latter tubes the film is *fixed*—that is the unexposed silver in the emulsion is dissolved out of the film and the emulsion itself is hardened.

The film is then carried through another series of tubes in which it is washed. These tubes contain clear circulating water of the proper temperature and at one stage of this progress it passes over an inspection light by which the operator is able to judge the photographic quality of his film as it is being processed.



DUPLEX AUTOMATIC DEVELOPING MACHINE
1-GENERAL VIEW 3- DRYING CABINET
2-AIR SQUEEGEE AND TAKEUP

At the end of the row of washing tubes are a series of tinting and toneing baths. At the top of these tubes are a series of levers by which the film can be run automatically into any one tinting solution, or if so desired it may pass up all tinting and toneing baths. The last of these tubes contain clear water in order to give that section of the film which has been tinted or toned the final wash before entering the drying room.



Types of Film Developing Machines

Leaving the washing tanks the film passes upward through an *air squeegee*. As the film passes through this device, little air blowers blow therefrom all excess water on the film so that when it enters the drying room it is only damp and not dripping wet with water.

The film next travels over another compensating elevator, much larger than the first one, as a matter of fact, and the purpose of this elevator is to slow up or increase the speed of either the preceding processes or the next process which is the drying process. By means of this elevator the film may leave the washing tanks at one speed, and enter the drying compartment at an entirely different speed, and if and when desired the mechanism controlling either department can be stopped entirely or run faster or slower.

The film now enters the drying compartments. Each compartment is practically air tight and is fed at the bottom with conditioned air. By conditioned air is

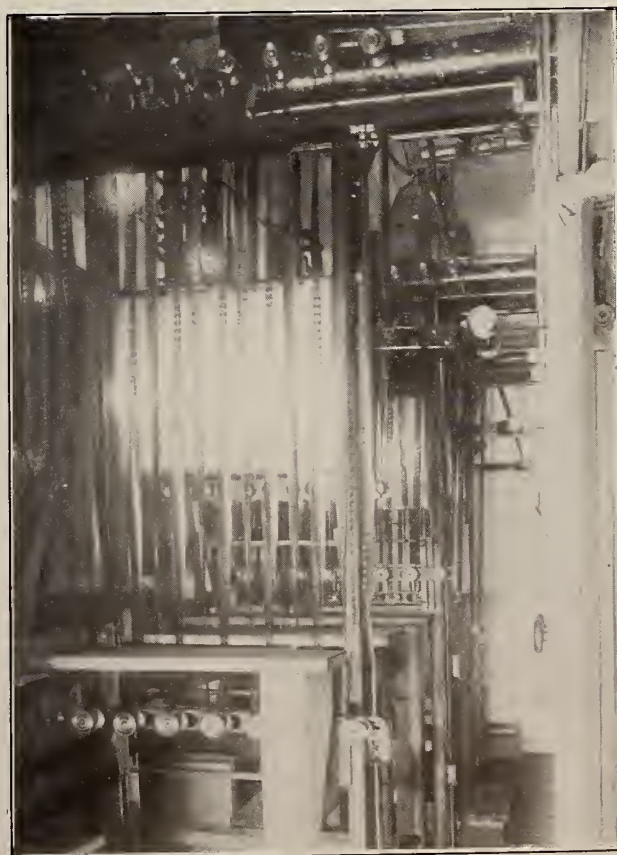
meant air which has been washed thoroughly clean and perfectly dehumidified and heated to the proper drying temperature. Leaving the drying compartment the film is re-wound on flange spindles or reels and is then removed for the purpose of inspecting and shipping.

It will be noticed from this description that at no time is it necessary to touch the film from the time it is put on the supply spindle until it is removed from the take-up spindles after it has been thoroughly processed and dried. The film is printed and developed in lengths of 1000 feet; thus, eliminating considerable number of splices with which the projectionist has to contend. Another feature is the fact that the film is dried in motion, therefore leaving the celluloid base quite pliable and not with definite kinks in the film which are bound to show up when it has been dried upon a rack or upon the hard wooden ribs of a drum.

Film so developed and dried eliminates the necessity of polishing as water spots do not have the opportunity to accumulate thereon as is the case in the film wound around racks or the ribs of drums. Also, it is quite easily to understand that film when printed in lengths of 1000 feet or more eliminate the constant handling by assembling girls when putting together rolls which have been printed and developed in lengths of 200 feet or less.

The minimum speed of this machine is sixty feet per minute and its maximum is eighty feet per minute. When one considers that each machine is double, it is easy to see that the daily maximum capacity of such a plant pyramids into big figures.

[Not often does the Projectionist have the opportunity to learn much about that phase of the motion picture industry with which he does not directly come in contact. And in as much as the process described above has a bearing upon the prints which Projectionists receive and must run in the projector, the editors believe that this article will prove both interesting and educational.]



WHEN WE WERE YOUNGER

By
JACK WOLHEIM

ONE seldom thinks back upon unusual experiences of his profession he encountered years back. Sometimes the sight of a bit of old equipment or a word here and there brings back sharp memories—and then their contrast with things as they are today startles one into a sudden realization that our craft has made tremendous progress in a very short time.

I have seen, as a Projectionist, the motion picture industry grow from the small nicollette to the large "Cathedrals". The Local of which I am a member—Local 306 of New York City—is today large and powerful, but I recall the anxiety and the hardship with which we first began to organize. Our Local and the Projectionist Locals everywhere are an indication of the might and respect which we all enjoy today in the industry. But back in the early days—



JACK WOLHEIM

I first began to project in a theatre that boasted 240 benches—not seats. The "projection room" was located in a corner in the rear of the place and was 5 feet wide and 6 feet high. The equipment consisted of a Powers machine and a 25 amp rheostat. The machine was ground by hand. We worked from 1 to 11 o'clock. There was no ventilation day or night. And now, look at our projection rooms.

Who in New York remembers the exchanges that were then supplying film and considered themselves the powers that be. They were the Western, Greater New York, Kessel and Baumann, and General. They were selling pictures with brands like Essanay, Triangle, Biograph, Thanhouser, Imp, Kalem, Bison, and Keystone and the stars were Johnson, Bunny, Costello, Finch, Walker, Bushman, Lawrence and Turner. Those were mighty names then, magical names to audiences, but who hears of them now.

In those days the duties of the Projectionist were very simple. As I remember this was a full day's work! To begin with the shows at that time was always changed daily. I reported at nine o'clock in the morning at whatever exchange supplied me with films for that day. After "arguing" with the other Projectionists who were there also waiting for film (no day was complete with this argument, generally about pictures and machinery, for then everything was new and novel) I received my 6 single reels and went to some other place for my posters. If the posters and the film had been properly turned in by the house that had them the day before I was finished quickly. If the film had not been returned or had been lost somewhere I was delayed many hours.

BAD REELS

DO not use bent or loose reels. Reels of this type cause damage to edges of the film. Reels that are bent out or widened will not keep the film in a smooth roll and when other reels are placed on top they are very apt to damage the edges of the film.

Reels that are bent in or too narrow will catch the edge of the film as it unwinds, causing it to jerk and chip the sprocket holes.

Reels that are loose at the hub are very apt to come apart in shipping and cause damage.

I generally reached the theatre about noon and then began at once to prepare for the show. I fixed the carbons, adjusted the lamps, tightened all the loose chairs on the floor and then was ready to start the show.

From then on until eleven o'clock I would alternately grind out a reel and then show slides while I was getting the next reel set. I ate with one hand and ground with the other. I showed slides when I wanted a few minutes rest. After eleven o'clock I packed the reels and the posters and started back to the exchanges to give them back. Then a snack at a restaurant and home—but it was then long after one o'clock. It was a long day's work and a very hard one.

Our troubles with film and projection equipment at that time were very much the same as at present. The intermittent bound up, the shutter wouldn't work, film broke, cement bad, etc., and there at the restaurant after the film had been returned we would chew over our day's experiences in the theatre. It was all very dear to us then. It fascinated us.

Then suddenly, one day we decided that we wouldn't carry films and posters from the exchange to the theatre and back again. We wanted those precious hours to rest for the grind that was ahead of us at the theatre. So all of us met one day and decided that on a certain day we would stop doing this. The exhibitors were wild. They wouldn't hear of it. But we all stuck together like glue in our resolution. We were threatened with the loss of our jobs. That didn't frighten us. Some of the boys did yield and continued the old practice but we put a stop to that very quickly. We watched the exchanges at night and when these men returned with the film—well we put a stop to it, that's all. That was the first big victory for our craft. Credit for this victory must go to Teddy Greenberg of Local 306, the same fighting Teddy as he is today.

Some of those boys have since gone "West". Others have left the craft for other occupations. But before I finish I want to pay my respects to a group of men to whom the Projectionists craft—at least in New York—owes a great deal. They worked from the beginning to better conditions. All of them today are rated as first class Projectionists. These men are Sam Kaplan, President of Local 306, Arthur Kahn, Tom Costello, Max Hollander, Teddy Greenberg, Sam Citron, De Bella, Sanders, Arthur Lichtenstein, Weinberger, Roncotti, Solich, Dick D'Acosta, Dave Chaney, Berkowitz, Zwilling, Jimmie Daisie, First, Johnny Pross, Abrahams, Ben Friedman, Turner and Manus.

WHAT PROJECTIONISTS ARE DOING

Local 171—Pittsburgh, Pa.

Under the auspices of the Theatre Managers Association of Pittsburgh a special midnight benefit performance was held at the Sheridan Square Theatre for the benefit of the Sick and Death funds of the two theatrical locals in Pittsburgh, Stage Employees No. 3 and Projectionists No. 171. The program was arranged by Mr. Eugene Connelly of the Harris Amusement Co. with Dave Manley of the vaudeville team of Manley and Baldwin, acting as master of ceremonies and contributing much to the gayety of the evening.



Alfred L. Criswell
Sec. Local 171

The entire Grand Theatre Symphony Orchestra under the baton of David Broudy, with Elias Breeskin noted concert violinist, appeared upon the stage and presented their listeners with a real musical treat. The orchestra also accompanied Dolores Cassinelli and Julian Oliver in excerpts from various operas. Loews-Penn and Aldine Theatres were generous in contributing artists for the performance sending Jimmie Carr and his band, Olivette and Leonard and Hines. The Stanley Co. sent from their Davis Theatre, Frakson with his famous cigarette trick and Lillian Fitzgerald the singing comedienne. Columbia burlesque was ably represented by Landers Bros. Jolly Jesters Co. which was well received by the audience. Space prevents comment upon the many other excellent acts who appeared among them being Marie MacQuarrie's Harp Ensemble, Ed Sheriff and Co., Blue Grass Four, Davis & McCoy, Jarow, Janet Childs, Artie Schramm's Troubadours, Bailey and Phil and Arselma and Max. These acts were sufficient to keep the show going

for three hours and what a show it was.

J. Rodger McKelvey, A. G. Williams and A. L. Criswell were the committee from the projectionists who arranged the performance with a committee from the Stage Employees consisting of Jacob Nolte, Mark Lewis and Wm. Hunzinger assisted by the entire stage and projection room crew of the Sheridan Square Theatre without whose valuable assistance much of the enjoyment would have been removed from the program.

The spirit of cooperation shown by the Theatre Managers Association, Eugene Connelly, James Balmer, Charles Strakosch, J. O. Hooley and other members of the association was remarkable and the Local Unions are deeply appreciative of the thought which sponsored this performance. Another benefit is planned for the near future to be given in one of the downtown theatres and the committees are now busily engaged in preparing their plans.

Pittsburg Chapter No. 5 of the American Projection Society recently opened its new clubhouse located at 7 Scott Place and ask all members to visit them when in the Pittsburg district. They are nicely equipped thruout and have a good active body of officers. Under the able leadership of Chauncey Thomas, the Chapter has shown a steady progress in the right direction. The clubhouse has been thrown open to the use of all members of the I. A. T. S. E. and shows signs of becoming a popular rendezvous for the projectionists of the Pittsburg district. "Jimmie" Oyer is steward of the club and presides over the kitchen with the help of "Beetle" Lauth of Ben Hur fame.

Loews-Penn Theatre opened recently with what is believed to be one of the finest equipped projection rooms in the United States and the screen results are all that could be desired. The projection department is being handled by Lawrence

Reilly, Harry Levin, Ralph Freeman and Harry Spang. A list of the equipment would read the same as the list published in the October issue of the Projectionist as the equipment for the ideal projection room. The theatre itself is the last word in modern motion picture theatre design and is a splendid monument to the memory of Marcus Loew. Herman Katz and James Gilliland are the Projectionists at Loew's Aldine Theatre which has reverted to the vaudeville and feature picture policy.



James A. Sipe

We are pleased to publish at this time the likeness of James A. Sipe, one of the pioneer members of Local Union 171 and the leading factor in the Wage Scale Committee negotiations during the past several years. "Jimmie" is a past-President of Local 171 and is Vitaphoning at the Olympic Theatre along with John Indo, Albert Ross and J. Rodger McKelvey. Members thruout the country who have attended the conventions of the Alliance will remember his smiling good humor.

Local 303—Hamilton, Ont.

On Friday night, October 28th, Mr. I. P. Gillette, representative of the Eastman Kodak Co., gave a very interesting lecture to the members of Local No. 303, I. A. T. S. E. on



Hugh J. Sedgwick
Sec. Local 303

the manufacture, care and handling of motion picture film.

Mr. Gillette described the basic materials of which motion picture film is made after which he showed

a motion picture of the actual making of the film stock at the Eastman Kodak Company's plant in Rochester from the preparation of the simple ingredients to the packing of the finished film.

After the lecture the members escorted Mr. Gillette to a banquet which had been prepared in his honor and everyone had a very enjoyable time until the small hours of the morning.

Local 435—Sault Ste. Marie

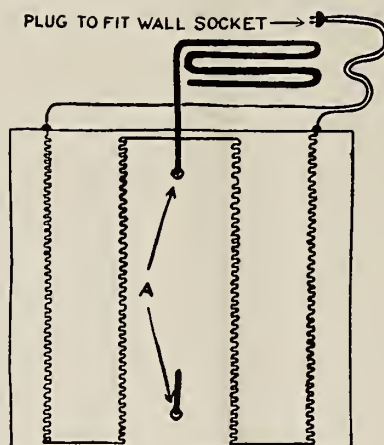
The operators of Local 435 were locked out of the Strand and Temple Theatres at Sault Ste. Marie, Michigan on October 10th. The Local had a little trouble putting through the contracts for the present year with these houses but with the help of Vice-President Covert it was accomplished. The manager then proceeded to take spite on the men working for him by discharging them after one man had worked in the same house for ten years and the second man for two years. The theatre refused to employ local men and insisted on importing men from outside which the local refused to allow so the home men were locked out. The musicians came out in sympathy and the houses are using scab operators and musicians at present. The Local has the full support of the Trades and Labor Council of this city and are picketing the houses every day.

Brother Hand of this Local has gone to Mitchell, South Dakota and is projecting at one of the theatres there.

EFFICIENCY "STUNTS"

F. BROADBENT, Secretary Local 360, Edmonton, Can., Reports
"Heating Element" developed by Brother McLean to
warm up Cold Projectors

Here is a stunt that they use in the Empress Theatre here. The projection room is so cold in the morning that the oil gets quite stiff and the projectors take some time to come up to normal speed. So



Brother McLean got a heating element and put 2 holes through the porcelain base, (as at A in the sketch) and passed a heavy wire through them leaving a length at the top. This he bent at right angles to the heater and formed a loop or slot to fit over and under the Top Plate No. P207D on his Simplex Projectors.

In the morning he opens the Left Door No. D11 of the projector he is starting with, and hangs the heating element up so that it is facing the intermittent movement case and almost touching the fly wheel. Then he plugs the heater in circuit and leaves it about five minutes when the projector moving parts are all warmed up.

While Projector No. 1 is running he uses the heater to warm up No. 2.

THE BIOSCOPE

The Leading Journal of the British
Cinematograph Industry

20th Year of Weekly Publication

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Shipping Can Properly Addressed



New Factory of the Chicago Cinema Equipment Co. in Chicago

When writing to Manufacturer or Dealer for information please mention the MOTION PICTURE PROJECTIONIST

Classified Index of Manufacturers and Dealers

including Local Addresses

This entire Index is corrected monthly. So far as possible it embraces every product, every manufacturer and every dealer of interest to projectionists. Manufacturers and Dealers are requested to look over this index carefully and report to us at once if their names are missing, wrongly spelled or wrong address listed. Insertions and corrections will be made at once.

Dealers

ALABAMA

Queen Feature Film Co., 1916½ Morris Ave., Birmingham, Ala.

ARIZONA

Arizona Film Supply Co., 323 Morley Ave., Nogales, Ariz.
Chester L. Dieterich, 100-A Pleasant St., Prescott, Ariz.

ARKANSAS

Butler Theatre Supply Co., Russellville, Ark.
Ensor & Co., 215 W. 3rd St., Little Rock, Ark.
Southern Film & Supply Co., 111½ Main St., Pine Bluff, Ark.

CANADA

Cameron Bros. Theatre Sup. Co., Regina, Can.
Canadian Theatre Supply Co., 22 Dundas St., West Toronto, Can.
Canadian Theatre Supply Co., Winnipeg, Can.
Coleman Elec. Co., 258 Victoria St., Toronto, Can.
Electrics, Ltd., Montreal Quebec, Can.
Perkins Elec. Co., 21 Wilton Sq., Toronto, Ont.
Perkins Electric Co., 2027 Bleury St., Montreal, Can.
Perkins Electric Co., 402 Film Exchange Bldg., Winnipeg, Can.
Aaron Stevens, 224 Eighth Ave., Calgary, Can.
Theatre Equipment Supply Co., 553 Granville St., Vancouver, Can.
United Electric Co., Ltd., 118 Granville St., Vancouver, B. C., Can.

CALIFORNIA

Bell & Slimson, 433½ E. 3rd St., Los Angeles, Cal.
Breck Photoplay Supply Co., 2028 S. Vermont Ave., Los Angeles, Cal.
Breck Photoplay Sup. Co., 98 Golden Gate Ave., San Francisco, Cal.
California M. P. Equip. Co., 836 S. Olive St., Los Angeles, Cal.
Davis Bros., 187 Golden Gate Ave., San Francisco, Cal.
Al Du Bus, 1072 Wilton Pl., Los Angeles, Cal.
Electrical Products Co., 1128 W. 16th St., Los Angeles, Cal.
G. Gennert, 917 Maple Ave., Los Angeles, Cal.
Ed H. Kemp, 309 Turk St., San Francisco, Cal.
Los Angeles Motion Picture Co., 215 E. Washington St., Los Angeles, Cal.
Herbert S. Mace, Redlands, Cal.
Miles Bros. of California, 1149 Mission St., San Francisco, Cal.
National Theatre Supply Co., 1910 So. Vermont St., Los Angeles, Cal.
National Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.
National Theatre Supply Co., 147 Leavenworth St., San Francisco, Cal.
Walter G. Preddy, 187 Golden Gate Ave., San Francisco, Cal.
C. L. Russel, Film Exchange Bldg., Los Angeles, Cal.
J. Slipper & Co., 838 S. Olive St., Los Angeles, Cal.
Southern Electrical Supply Co., 3rd and East Sts., San Diego, Cal.
Theatre Ltg. & Equip. Co., 253 Golden Gate Ave., San Francisco, Cal.

Dealers

Theatre Equipment Supply Co., 146 Leavenworth St., San Francisco, Cal.
Theatre Supply Co., 1956 Vermont St., Los Angeles, Cal.
Western Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.

CENTRAL AMERICA

J. Carter Searcy, Guatemala City, Guatemala.

COLORADO

National Theatre Supply Co., 2106 Broadway, Denver, Colo.

CONNECTICUT

Corrigan's Theatre Equip Co., 50 W. Main St., Waterbury, Conn.
National Theatre Supply Co., 131 Meadow St., New Haven, Conn.
Repas, Harries & Co., 255 Franklin Ave., Hartford, Conn.
Conn. Independent M. S. Co., 131 Meadow St., New Haven, Conn.
Independent M. S. Co., 131 Meadow St., New Haven, Conn.

DELAWARE

Carl B. Rehder, Wilmington, Del.

FLORIDA

Amusement Supply Co., 312½ Twigg St., Tampa, Fla.
Drollinger Theatre Supply Co., 9 S. Lee St., Jacksonville, Fla.
Griffith, G. W., Box 2333, Tampa, Fla.
Tampa Photo & Art Supply Co., 314 Twiggs St., Tampa, Fla.

GEORGIA

Consolidated Film & Supply Co., 111 Walton St., Atlanta, Ga.
National Theatre Supply Co., 102½ Walton St., Atlanta, Ga.
Southern Theatre Equipment Co., 9 Nassau St., Atlanta, Ga.
Eugene Wilde, P. O. Box 102, Atlanta, Ga.

ILLINOIS

Acme M. P. Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Amusement Supply Co., 740 S. Wabash Ave., Chicago, Ill.
Burke & Jones, Chicago, Ill.
Capital Merchandising Co., 536 S. Dearborn St., Chicago, Ill.
Chicago Stg. & Ltg. Co., 112 N. LaSalle St., Chicago, Ill.
Chicago Cinema Equip. Co., 820 So. Tripp Ave., Chicago, Ill.
C. G. Demel, 845 S. State St., Chicago, Ill.
Exhibitors' Supply Co., 825 So. Wabash Ave., Chicago, Ill.
Fulco Schaffer Sales Co., 24 E. 8th St., Chicago, Ill.

Dealers

E. E. Fulton Ct., 1018 So. Wabash Ave., Chicago, Ill.
Holke Theatre Supply Co., 845 So. State St., Chicago, Ill.
Joseph Hopp, 57 E. Jackson Blvd., Rm. 604, Chicago, Ill.
Illinois Theatre Equip. Co., 12-14 E. 9th St., Chicago, Ill.
Kiefer Elec. Supply Co., Peoria, Ill.
Midwest Ticket & Supply Co., 845 So. Wabash Ave., Chicago, Ill.
Monarch Theatre Supply Co., 724 So. Wabash Ave., Chicago, Ill.
Movie Supply Co., 844 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 825 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 624 So. Michigan Ave., Chicago, Ill.
Royal Theatre & Supply Co., 180 East Ave., Kankakee, Ill.
Joseph Spratler, 12-14 E. 9th St., Chicago, Ill.
Western Motion Pictures Co., 102 W. Main St., Danville, Ill.
Co-operative Amusement & Supply Co., Gaiety Theatre Bldg., Springfield, Ill.

INDIANA

Exhibitors Supply Co., 128 W. Ohio St., Indianapolis, Ind.
Fort Wayne Engineering & Supply Co., 6th and No. Harrison Sts., Fort Wayne, Ind.
Fulco Sales Co., 111 So. Capitol Ave., Indianapolis, Ind.
E. E. Fulton Co., 111 So. Capitol Ave., Indianapolis, Ind.
H. Liever Co., 24 W. Washington St., Indianapolis, Ind.
Muncie Film Supply Co., 202½ E. Main St., Muncie, Ind.
National Theatre Supply Co., 128 W. Ohio St., Indianapolis, Ind.

IOWA

Blackmore, W. F., 315 Brady St., Davenport, Iowa.
Dubuque Sales Co., 2734 Jackson St., Dubuque, Iowa.
Eastman Kodak Stores, Inc., 608 Pierce St., Sioux City, Iowa.
Exhibitors' Supply Co., Des Moines, Iowa.
National Theatre Supply Co., 1004 Grand Ave., Des Moines, Iowa.
National Theatre Supply Co., 10th and High Sts., Des Moines, Iowa.
Zimmerman Brothers, Sioux City, Iowa.

KANSAS

Southwest Theatre Equipment Co., Wichita, Kans.

KENTUCKY

American M. P. Co., Alamo Theater Bldg., Louisville, Ky.
Blake Amusement Co., 435 So. 3rd St., Louisville, Ky.
Scheckler, Arthur V., Tyler Bldg., Louisville, Ky.
Louisville Film & Supply Co., Rex Theatre Bldg., 555 So. 1st St., Louisville, Ky.

Dealers**LOUISIANA**

Consolidated Film & Supply Co., 914 Craver St., New Orleans, La.
 Crescent City Film Exchange, 621 Poydras St., New Orleans, La.
 Electrical Supply Co., 324 Camp St., New Orleans, La.
 Harcol M. P. Industries, 610 Baronne St., New Orleans, La.
 National Theatre Supply Co., 610 Saratoga St., New Orleans, La.
 Southern Theatre Equipment Co., New Orleans, La.
 Southern Theatre Service, 1219 Alvar St., New Orleans, La.
 Vivirito, George, 318 Batonna St., New Orleans, La.

MAINE

Pine Tree State Amusement Co., 85 Market St., Portland, Maine.

MARYLAND

Dusman, J. F., 213 No. Calvert St., Baltimore, Md.
 Haelele, N. C., 228 Gay St., Baltimore, Md.
 Lewy Studios, 853 No. Eutaw St., Baltimore, Md.
 National Theater Supply Co., 228 Gay St., Baltimore, Md.
 Townsend, H. S., 1625 E. 29th St., Baltimore, Md.
 Wyatt, E. J., 1605 No. Milton Ave., Baltimore, Md.

MASSACHUSETTS

Eastern Theatre Equip. Corp., 65 Broadway, Boston, Mass.
 Exhibitors' Supply Co., 67 Church St., Boston, Mass.
 Gately, J. F., 33 Lyman St., Springfield, Mass.
 Handy, A. D., Boston, Mass.
 Independent Theatre Supply Co., 49 Church St., Boston, Mass.
 Marson, R. D., 106 Broadway, Boston, Mass.
 National Theatre Supply Co., 69 Church St., Boston, Mass.
 Rotman, Morris, 26 Browning Ave., Dorchester, Mass.
 United Theatre Equip. Co., 26 Piedmont St., Boston, Mass.
 Wells & Douglas, 1108 Boylston St., Boston, Mass.
 Wetmore, B. C., 2 Park Sq., Boston, Mass.
 Wheaton, L. B., Worcester, Mass.
 Worcester Film Corp., 340 Mason St., Worcester, Mass.

MICHIGAN

Amusement Supply Co., Film Bldg., Detroit, Mich.
 Cinema Ser. Co., 141 Elizabeth St., E., Detroit, Mich.
 Exhibitors' Supply Co., 14 Elizabeth St., Detroit, Mich.
 Feldstein, A. N., 1670 Pasadena Ave., Detroit, Mich.
 Theo. Kundtz & Co., 402 Lincoln Bldg., Detroit, Mich.
 McArthur Equip. Co., 1963 Grand River Ave., Detroit, Mich.
 National Theatre Supply Co., 2105 John R St., Detroit, Mich.
 Service Theatre Supply Co., 137 Elizabeth St., Detroit, Mich.

MINNESOTA

Cunningham, H. B., 964 University Ave., St. Paul, Minn.
 Exhibitors' Supply Co., 612 Producers' Exchange Bldg., Minneapolis, Minn.
 General Distributing Co., 110 Lake Ave., So., Duluth, Minn.
 Huntleys, The, Winona, Minn.
 Lochran Film & Slide Svc., 706 Film Exchange Bldg., Minneapolis, Minn.
 National Equipment Co., 409 W. Michigan Ave., Duluth, Minn.
 Northern Theatre Supply Co., 221 Loeb Arcade, Duluth, Minn.

Dealers

Rialto Theatre Supply Co., 56 Western Ave., Minneapolis, Minn.
 Rialott Co., The, Minneapolis, Minn.
 Standard Equipment Corp., 39 Western Ave., Minneapolis, Minn.
 Teco Products Mfg. Co., 245 Loeb Arcade, Minneapolis, Minn.
 Twin City Caldium & Supply Co., 706 First Ave., N., Minneapolis, Minn.
 United Theatre Sup. Co., 34 Western Ave., Minneapolis, Minn.
 The Western Equip. Exchange, 35 Western Ave., Minneapolis, Minn.

MISSISSIPPI

Southern Theatre Service, P. O. Box 455, Grenada, Miss.

Is your name in this index?

Is your name spelled correctly, address right?

If not, write to the Index Dept., The Motion Picture Projectionist, 45 West 45th Street, Suite 701, New York City.

Corrections will be inserted promptly.

MISSOURI

Cole Theatre Supply Co., 109 W. 18th St., Kansas City, Mo.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Exhibitors' Supply Co., 3316 Lindell St., St. Louis, Mo.
 Fulco-Schaffer Co., 3301 Olive St., St. Louis, Mo.
 Fulton, E. E., & Co., 3403 Olive St., St. Louis, Mo.
 National Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 National Theatre Supply Co., 3315 Olive St., St. Louis, Mo.
 Opera Supply Co., 601 Shubert Bldg., St. Louis, Mo.
 Sanderson Elec. Co., St. Louis, Mo.
 Schweig & Engel Theatre Supplies, St. Louis, Mo.
 Star Film & Supply Co., 413 Edward St., St. Joseph, Mo.
 Stebbins, Charles M., Picture Supply Co., 1822 Wyandotte St., Kansas City, Mo.
 Yale Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 A-A Electric Machinery Co., 1117 Cherry St., Kansas City, Mo.

MONTANA

Western Theatre Equipment Corp., Billings, Mont.

NEBRASKA

Eastman Kodak Stores, Inc., Lincoln, Neb.
 Exhibitors' Supply Co., 1518 Davenport St., Omaha, Neb.
 Lincoln Photo Supply Co., Omaha, Neb.
 National Theatre Supply Co., 1514 Davenport St., Omaha, Neb.
 Serice Theatre Supply Co., 303 No. 16th St., Omaha, Neb.
 U. S. Theatre Supply Co., 1506 Davenport St., Omaha, Neb.
 United Theatre Equip. Corp., 323 So. 15th St., Omaha, Neb.
 Western Supply Co., 2581 Kansas Ave., Omaha, Neb.
 Western Theatre Supply Co., 15th and Davenport Sts., Omaha, Neb.

Dealers**NEW JERSEY**

Kaufman, Frank N., 750 Broad St., Newark, N. J.
 Metropolitan Motion Picture Co., 116 Market St., Newark, N. J.

NEW MEXICO

Eastern New Mexico Theatre Supply Co., Box 548, Clovis, N. M.

NEW YORK

J. F. Adams, 459 Washington St., Buffalo, N. Y.
 Acme Exchange, 341 W. 44th St., N. Y. City.
 Amusement Supply Co., 729 Seventh Ave., N. Y. City.
 Auburn Film Co., Auburn, N. Y.
 Auburn Theatrical Supply Co., Auburn, N. Y.
 A. Z. Motion Picture Supply Co., 266 Houston St., N. Y. City.
 A. Z. Motion Picture Supply, 1413 Bedford Ave., Brooklyn, N. Y.
 Becker Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Behrend Motion Picture Supply Co., 729 Seventh Ave., N. Y. City.
 Bender, George, 28 Centre St., N. Y. City.
 Better Service Film Co., 110 Ferris Ave., Syracuse, N. Y.
 Capitol Motion Picture Supply Co., 727 Seventh Ave., N. Y. City.
 Capitol Stg. & Ltg. Co., 626 Tenth Ave., N. Y. City.
 Columbia Stg. Ltg. Co., 709 Columbia Theatre Bldg., N. Y. City.
 Crouse, Hinds Co., Wolf and 7th Sts., Syracuse, N. Y.
 Crown Motion Pic. Supplies, 729 Seventh Ave., N. Y. City.
 Davie Press, Inc., 267 W. 17th St., N. Y. City.
 Empire Theatre Supply Co., 42 Orange St., Albany, N. Y.
 Empire Theatre Sup. Co., 619 Spring St., Utica, N. Y.
 Fenyessey, Carol, Rochester, N. Y.
 Gennert, G., 24 E. 13th St., N. Y. City.
 Greenbaum, 436 Corneliuss St., Brooklyn, N. Y.
 Herbert & Huesgen, 18 E. 42nd St., N. Y. City.
 Hudson Elec. Equip. Co., 141 W. 44th St., N. Y. City.
 Independent Movie Sup. Co., 42 Orange St., Albany, N. Y.
 Lyon, J. T. & D. B., Schenectady, N. Y.
 Kaplan, Sam, 729 Seventh Ave., N. Y. City.
 Mason, Chas. E., 103 W. Main St., Rochester, N. Y.
 Mestrum, H., 817 Sixth Ave., N. Y. City.
 Modern Elec. Mch. Co., 2927 Third Ave., N. Y. City.
 Motion Picture Apparatus Co., 110 W. 32nd St., N. Y. City.
 Motion Picture Svc. Co., 417 W. 44th St., N. Y. City.
 National Theatre Supply Co., 1560 Broadway, N. Y. City.
 National Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Perfection Supply Co., 98 Park Pl., N. Y. City.
 S & M Sales Co., 123 Lafayette St., Utica, N. Y.
 Supreme Motion Picture Repair Co., 926 Broadway, Brooklyn, N. Y.
 Syracuse Supply Co., 314 W. Fayette St., Syracuse, N. Y.
 United Proj. & Film Corp., 51 Chapel St., Albany, N. Y.
 United Proj. & Film Corp., 228 Franklin St., Buffalo, N. Y.
 Univ. Elec. Stage Ltg. Co., 321 W. 50th St., N. Y. City.

NORTH DAKOTA

McCarthy Supply Co., 619 N. P. Ave., Fargo, N. D.

NORTH CAROLINA

A. & B. Moving Picture Supply Co., Raleigh, N. C.
 Carolina Theatre Supply Co., United Film Bldg., Charlotte, N. C.
 Ettabran Film Co., Charlotte, N. C.
 Exhibitors' Supply Co., Charlotte, N. C.
 National Theatre Supply Co., 222 W. 4th St., Charlotte, N. C.

Dealers**OHIO**

American Theatre Equipment Co., 165½ No. High St., Columbus, Ohio.
 American Theatre Supply Co., 310 St. Clair St., Toledo, Ohio.
 Artfilm Co., Cleveland, Ohio.
 Bodiker, D. A., 128 No. Garfield St., Dayton, Ohio.
 Central F. F. Co., 60 Public Sq., Lima, Ohio.
 Cincinnati Theatre Supply Co., Broadway Film Bldg., Cincinnati, Ohio.
 Cincinnati M. P. Co., 1434 Vine St., Cleveland, Ohio.
 Dayton Theatre Sup. Co., 225 Jefferson St., Dayton, Ohio.
 Doner, Frank M., 2409 Maple Wood Ave., Toledo, Ohio.
 Dwyer Bros. & Co., 520 Broadway, Cincinnati, Ohio.
 Exhibitors' Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Folwer & Salter, Cleveland, Ohio.
 Gill Electric Co., 46 Cypress Ave., Columbus, Ohio.
 Gross & Johnson, 2100 Payne Ave., Cleveland, Ohio.
 Limbocker, George, Springfield, Ohio.
 Motion Picture Equip. Co., 17 Ervin Block, West Canton, Ohio.
 Moving Picture Equip. Co., 208 Market Avenue, So., Canton, Ohio.
 Moving Picture Supply Co., 439 Falls Ave., Youngstown, Ohio.
 National Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 National Theatre Supply Co., 520 Broadway, Cincinnati, Ohio.
 O'Connor & Co., A., 9702 Euclid Ave., Cleveland, Ohio.
 Oliver Moving Pic. Sup. Co., Film Exchange Bldg., Cleveland, Ohio.
 Post Glover Elec. Co., Cincinnati, Ohio.
 Price, L. M., Co., 108 W. 4th St., Cincinnati, Ohio.
 Romell Motion Pictures, Inc., 1411 Walnut St., Cincinnati, Ohio.
 Runey, Clarence E., 1434 Vine St., Cincinnati, Ohio.
 Standard Film & Svc. Co., Cleveland, Ohio.
 Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Tri-State Supply Co., 2112 Payne Ave., Cleveland, Ohio.

OKLAHOMA

Anderson Theatre Supply Co., 116 So. Hudson St., Oklahoma City, Okla.
 National Theatre Supply Co., 308 W. California St., Oklahoma City, Okla.
 United Theatre Equip. Corp., 116 So. Hudson St., Oklahoma City, Okla.
 Yale Theatre Supply Corp., 10 So. Hudson St., Oklahoma City, Okla.
 Southern Theatre Equip. Co., 328 California Ave., Oklahoma City, Okla.
 Shelton, J. M., Oklahoma City, Okla.

OREGON

Bentley, E. E., Hillsboro, Ore.
 Conant, C. F., Portland, Ore.
 National Theatre Supply Co., 460 Glisan St., Portland, Ore.
 National Theatre Supply Co., 393 Oak St., Portland, Ore.
 Portland Moving Picture Mch. Co., Rivoli Theatre Bldg., Portland, Ore.
 Service Film & Supply Co., 393 Oak St., Portland, Ore.

PENNSYLVANIA

Alexander, George H., Diamond St., Pittsburgh, Pa.
 Atlas Supply Co., 108 Ring St., Philadelphia, Pa.
 Bennell, Chas. H., 261 No. Clarion St., Philadelphia, Pa.
 Bennett, C. H., 224 No. 13th St., Philadelphia, Pa.
 Catsiff, J., 1214 Market St., Philadelphia, Pa.
 Chamberlain Amuse. Enter., Inc., Shamokin, Pa.
 Columbia Film Service, 1010 Forbes St., Pittsburgh, Pa.
 Consolidated Film Co., 1237 Vine St., Philadelphia, Pa.

Dealers

Electric Theatre Supply Co., 1309 Vine St., Philadelphia, Pa.
 Gompertz, Abram B., Exhibitors' Clearing House & Supply Co., 1243 Vine St., Philadelphia, Pa.
 Hannson, J. G., 10th and Spring Sts., Reading, Pa.
 Hollis, Smith & Morton, 1024 Forbes St., Pittsburgh, Pa.
 Janicks, Michael, 1105 Gibbons St., Pittsburgh, Pa.
 Morton, Ed. B., 1006 Forbes St., Pittsburgh, Pa.
 Motion Picture Machine Co., 609 Neville St., Pittsburgh, Pa.
 National Theatre Supply, 1024 Forbes St., Pittsburgh, Pa.
 National Theatre Supply Co., 1311 Vine St., Philadelphia, Pa.
 Phila. Theatre Equip. Co., 252 No. 13th St., Philadelphia, Pa.
 Pittsburgh M. P. Supply Co., 1006 Forbes St., Pittsburgh, Pa.
 Rizzo, Clem, 262 No. 13th St., Philadelphia, Pa.
 S & S Film & Supply Co., A. Steinberg, 1026 Forbes St., Pittsburgh, Pa.
 Smith, H. J., Superior Motion Picture Sup. Co., 1028 Forbes St., Pittsburgh, Pa.
 Swaab & Son, Lewis M., 1327 Vine St., Philadelphia, Pa.
 Williams, Browne & Earle, 918 Chestnut St., Philadelphia, Pa.
 Cadoret, William H., Theatre Supply Co., Scranton, Pa.
 Equipment Theatre Supply Co., Penn Ave., Scranton, Pa.

RHODE ISLAND

Allen Feature Film Co., Providence, R. I.
 McKenna, James, Providence State Ltg. Co., 12 Moulton St., Providence, R. I.
 Taylor, H. O. & E. S., 76 Dorrence St., Providence, R. I.

SOUTH CAROLINA

Independent Theatre Supply Co., 111 W. Coffee St., Greenville, S. C.

SOUTH DAKOTA

American Theatre Supply Co., Sioux Falls, S. D.

TENNESSEE

Consolidated Film & Supply Co., 226 Union Ave., Memphis, Tenn.
 Monarch Theatre Supply Co., 228 Union Ave., Memphis, Tenn.
 White Theatre Equipment Co., Phipps Bldg., Bristol, Tenn.

TEXAS

Atlantic Sales Co., 1816 Main St., Dallas, Tex.
 Dallas Theatre Supply Co., 1911 Commerce St., Dallas, Tex.
 National Theatre Supply Co., 306 So. Harwood St., Dallas, Tex.
 Peerless Film Svc., 322 San Antonio St., El Paso, Tex.
 Educational Equip. Co., 1913-A Commerce St., Dallas, Tex.
 Simplex Theatre Supply Co., Film Exchange Bldg., Dallas, Tex.
 Simpson, James P., Co., Inc., Dallas, Tex.
 Southern Film Svc., 811 Franklin Ave., Houston, Tex.
 Southern Theatre Equip. Co., 1815 Main St., Dallas, Tex.
 Thrash, R. D., Co., Film Row, Dallas, Tex.

UTAH

Alhambra Theatrical Co., Hudson Ave., Ogden, Utah.
 Argus Enterprises Co., Inc., 132 E. Second St., Salt Lake City, Utah.
 National Theatre Supply Co., 132 E. 2nd St., Ogden, Utah.
 Salt Lake Theatre Supply Co., 48 Exchange Pl., Salt Lake City, Utah.
 Universal Film & Supply Co., 56 Exchange Pl., Salt Lake City, Utah.

Dealers

Utah Theatre Supply Co., 125 E. 2nd South St., Salt Lake City, Utah.
 Worman Supply Co., 2429 Hudson Ave., Ogden, Utah.

VERMONT

Allen & Underhill, Chelsea, Vt.
 H. P. Boardman, Burlington, Vt.

VIRGINIA

Burchard W. A., Co., 56 Commerce St., Norfolk, Va.
 Chocklett, Luther A., Co., Over Mt. Trust Bldg., Roanoke, Va.
 Southern Theatre Supply Co., 25 Old St., Petersburg, Va.

WASHINGTON, D. C.

Capitol Theatre Supply, 316 McGill Bldg., Washington, D. C.
 Carroll Electric Co., 714 12th St., N. W., Washington, D. C.
 Colman, 916 G St., N. W., Washington, D. C.
 Columbia Photo Supply Co., 1424 New York Ave., N. W., Washington, D. C.
 Fuller & D'Albert, 815 10th St., N. W., Washington, D. C.
 Higgins, F. L., 804 11th St., N. W., Washington, D. C.
 L & S Theatre Sup. Co., 908 G St., N. W., Washington, D. C.
 Theatre Supply Co., 916 G St., N. W., Washington, D. C.
 Lust, Sidney B., 916 G St., N. W., Washington, D. C.
 National Theatre Supply Co., 719 9th St., N. W., Washington, D. C.
 Scientific & Cinema Supply Co., 804 11th St., N. W., Washington, D. C.
 Southern Moving Picture Corp., 310 McGill Bldg., Washington, D. C.
 Thompson, E. B., 722 10th St., N. W., Washington, D. C.
 Washington Theatre Supply Co., 719 9th St., N. W., Washington, D. C.

WASHINGTON

Film Supply Co., 217 Virginia St., Seattle, Wash.
 Graham, John W., Spokane, Wash.
 Lowman & Handford, Seattle, Wash.
 National Theatre Supply Co., 1927 Third Ave., Seattle, Wash.
 Shearer, B. F., Inc., 210 Virginia St., Seattle, Wash.
 Spokane Theatre Supply Co., 410 W. 1st St., Spokane, Wash.
 Theatre Supply Co., 2016 Third Ave., Seattle, Wash.

WEST VIRGINIA

Charleston Elec. Sup. Co., Charleston, W. Va.
 Charleston Theatre Supply Co., Charleston, W. Va.
 Columbia Film Svc. Co., 707 Dryden St., Charleston, W. Va.
 Educational Film Co. of West Virginia, Charleston, W. Va.
 McGray & McGray Co., 329 Main St., Fairmont, W. Va.
 Standard Theatre Supply Co., 3608 Jacob St., Wheeling, W. Va.
 West Virginia Amusement & Film Co., 113½ Capitol St., Charleston, W. Va.

WISCONSIN

National Theatre Supply Co., 715 Wells St., Milwaukee, Wis.
 Smith, Ray, Co., Toy Bldg., Milwaukee, Wis.
 Wisconsin Film Corp., 134 Grand Ave., Milwaukee, Wis.
 Wisconsin Theatre Supply Co., 174 2nd St., Milwaukee, Wis.

*Manufacturers**Arc Lamps*

Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
 Burke & James, 425 So. Wabash Ave., Chicago, Ill.
 Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
 Cinema Studios Supply Corp., 1438 Beechwood Dr., Hollywood, Cal.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly, Inc., 129 Grand St., New York City.
 Hallberg, J. H., 445 Riverside Dr., New York City.
 International Projector Corp., 90 Gold St., New York City.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Max Mayer Co., 218 W. 42nd St., New York City.
 Motion Picture Service Co., 417 W. 44th St., New York City.
 Mestrum, Henry, 817 Sixth Ave., New York City.
 Rollaway Motor Co., 122 Southard Ave., Toledo, Ohio.
 Strong Lamp Co., 3248 Monroe St., Toledo, Ohio.
 Wohl & Co., Inc., M. J., Paynter Ave. and Hancock St., Long Island City, N. Y.

Booths, Projection

A. G. Mfg. Co., Seattle, Wash.
 Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Blaw Knox Co., Bayard and Warner Sts., Baltimore, Md.
 Edward Mfg. Co., Cincinnati, Ohio.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Goldberg Bros., 1646 Lawrence St., Denver, Colo.
 Harry Steel Co., O. K., 2333 Papin St., St. Louis, Mo.
 Johns-Manville Co., 41st St. and Madison Ave., New York City.
 Keasbey & Mattison Co., Dept. N., Ambler, Pa.
 Langslow Co., H. R., 232 Jay St., Rochester, N. Y.
 Mestrum, Henry, 810 Sixth Ave., New York City.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newman Mfg. Co., 416 Elm St., Cincinnati, Ohio.
 Riverside Mfg. Co., Newark, N. J.
 Sharlow Bros., 442 W. 42nd St., New York City.
 Steel Roofing & Stamping Works, 506 S. W. 2nd St., Des Moines, Iowa.
 Thorp Fire Proof Door Co., Minneapolis, Minn.
 Williams, Browne & Earle, Inc., 918 Chestnut St., Philadelphia, Pa.

Carbons

Arco Electric Co., 110 W. 42nd St., New York City.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Diesman, J. D., Baltimore, Md.
 M. G. Felder, 1560 Broadway, New York City.
 Hiegel, Frank J., 440 State St., Schenectady, N. Y.
 National Carbon Co., Madison Ave., N. W., and W. 117th St., Cleveland, Ohio.
 Phellis & Co., C. W.
 Hugo Reisinger, 11 Broadway, New York City.
 Warner Prod. Co., Inc., 265 Canal St., New York City.

Cases and Cans, Reel Carrying

Ajax Film Accessories Co., 30 Church St., New York City.
 American Can Co., New York City, N. Y.
 Bass Camera Co., 109 No. Dearborn St., Chicago, Ill.
 Erker Bros. Optical Co., Olive St., St. Louis, Mo.

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INDEX**DEPARTMENT**

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 Canada**

**RATES ON APPLICATION**

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**The
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Manufacturers

Fulton Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Gotham Can Co., 57 Eagle St., Brooklyn, N. Y.
 Indestructible Metal Products Co., 521 W. 45th St., New York City.
 Los Angeles Can Co., Los Angeles, Cal.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newmade Products Corp., 249 W. 47th St., New York City.
 Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.
 Russakov Can Co., Chicago, Ill.

Cement, Film

Bass Camera Co., 109 N. Dearborn St., Chicago, Ill.
 Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
 Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
 Eastman Kodak Co., Rochester, N. Y.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 International Projector Corp., 1130 W. Austin Ave., Chicago, Ill.
 Monarch Theatre Supply Co., 1223 So. Wabash Ave., Chicago, Ill.
 Newmade Products Corp., 248 W. 47th St., New York City.
 Rothacker Film Mfg. Co., 1339 Diversey Pkwy., Chicago, Ill.
 Technical Color & Chem. Works, 523 Third Ave., Brooklyn, N. Y.
 Weldon Film Cement Co., 301 Loeb Arcade, Minneapolis, Minn.

Film Safes and Cabinets

American Film Safe Corp.
 Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
 Columbia Metal Box Co., 226 E. 144th St., New York City.
 Duplex Motion Picture Industries, 74 Sherman Ave., Long Island City, N. Y.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Film Safe Co., 92 William St., New York City.
 Agent for American Film Safe Corp., Baltimore, Md.
 Fulton, E. E., 3208 Carroll Ave., Chicago, Ill.
 Newmade Products Corp., 249 W. 47th St., New York City.
 Peterson Co., C. J., 723 Fulton St., Chicago, Ill.
 Sharlow Bros. Co., 442 W. 42nd St., New York City.

Film Splicing Machines

Bass Camera Co., 109 N. Dearborn St., Chicago, Ill.
 Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
 Burke & James, 425 So. Wabash Ave., Chicago, Ill.
 Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
 Duplex Machine Co., 317 Seventy-Fifth Ave., Brooklyn, N. Y.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Gennert, Inc., G., 24 E. 13th St., New York City.
 Griswold Machine Works, Port Jefferson, N. Y.
 Lochren Film & Slide Co., Wm. A., 706 Film Exchange Bldg., Minneapolis, Minn.
 Neumade Products Corp., 249 W. 47th St., New York City.
 Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.

Lamps

Edison Lamp Works of the General Electric Co., Harrison, N. J.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 National Lamp Works, Nela Park, Cleveland, Ohio.
 Westinghouse Lamp Co., 150 Broadway, New York City.

Manufacturers**Lamps, Reflector**

Bessler Co., Charles, 131 E. 23rd St., New York City.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Goetz American Optical Co., 317 E. 34th St., New York City.
 International Projector Corp., 90 Gold St., New York City.
 Kleigl Bros. Universal Stage Light Co., Inc., 321 W. 50th St., New York City.
 McAuley Mfg. Co., J. E., 552 W. Adams St., Chicago, Ill.
Morelite Co., Inc., 600 W. 57th St., New York City.
 Preddy, Walter G., 187 Golden Gate Ave., San Francisco, Cal.
 Warren Products, 265 Canal St., New York City.

Lights, Spot

Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Best Devices, 22 Film Bldg., Cleveland, Ohio.
 Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
 Burke & James, 425 S. Wabash Ave., Chicago, Ill.
 Capitol Stage Lighting Co., 626 Tenth Ave., New York City.
 Chicago Electric Sign Co., 2219 Grand Ave., Chicago, Ill.
 Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
 De Bus, Al., 1072 N. Wilton Pl., Hollywood, Cal.
 Diesman, J. F. D., Baltimore, Md.
 Display Stage Lighting Co., 334 W. 44th St., New York City.
 Enswistle, R. C., 304 W. 52nd St., New York City.
 Erikson, Electric Co., L., 6 Portland St., Boston, Mass.
 Franklin Electric Products Co., 750 Prospect Ave., S. E., Cleveland, Ohio.
 Frink, Inc., I. P., 24th St. and Tenth Ave., New York City.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly, 129 Grand St., New York City.
 Hub Electric Co., 2219 W. Grand St., Chicago, Ill.
 Kansas City Scenic Co., 24th and Harrison Sts., Kansas City, Mo.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Klouček, Chas. E., 528 Flanders St., Portland, Ore.
 Mestrum, Henry, 817 Sixth Ave., New York City.
 Motion Picture Service Co., 417 W. 44th St., New York City.
 Newton, Chas. I., 224 W. 14th St., New York City.
 Perkins Electric Co., 21 Wilton Sq., Toronto, Ont.
 Sun Ray Lighting Co., 119 Lafayette St., New York City.
 Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Wheeler Green Electric Co., 29-39th St., Rochester, N. Y.
 Wohl & Co., M. J., Hancock St., Long Island City, N. Y.

Projectors

American Motion Picture Projector Co., 1134 W. Austin Ave., Chicago, Ill.
 Baird Motion Picture Machine Co., 31 Runyon St., Newark, N. J.
 Bell & Howell Co., 1801 Larchmont St., Chicago, Ill.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 International Projector Corp., 90 Gold St., New York City.
Kaplan, Sam, 729 Seventh Ave., New York City.

Manufacturers**Reels, Film**

Acme Stamping & Mfg. Co., Pittsburgh, Pa.
 Duplex M. P. Industries, Inc., Long Island City, N. Y.
 Geometric Stamping Co., 221 E. 131st St., Cleveland, Ohio.
 Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, Ohio.
 Goldberg Bros., 1646 Lawrence St., Denver, Colo.
 Heigel, Frank J., 440 State St., Schenectady, N. Y.
 Mossberg Co., Frank, Attleboro, Mass.
 Neumade Products Corp., 249 W. 47th St., New York City.
 Sharlow Bros. Co., 442 W. 42nd St., New York City.
 Taylor-Shantz Co., 478 St. Paul St., Rochester, N. Y.
 Winship & Sons, W. W., Utica, N. Y.

Reflectors, Light

American Reflector & Lighting Co., 100 So. Jefferson St., Chicago, Ill.
 Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
 Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
 Curtis Lighting Co., 1119 W. Jackson Blvd., Chicago, Ill.
 Erickson Electric Co., 6 Portland St., Boston, Mass.
 Frink, I. P., Inc., 239 Tenth Ave., New York City.
 General Outdoor Advertising Co., 550 W. 27th St., New York City.
 Heinrich Reflector Co., 645 W. 43rd St., New York City.
 Hub Electric Co., 2219 W. Grand Ave., Chicago, Ill.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Major Equipment Co., Inc., 4603 Fullerton Ave., Chicago, Ill.

Rewinders

Atlas Metal Works, Dallas, Texas.
 Automatic Film Rewinder, Harrisburg, Pa.
 Bass Camera Co., 109 Dearborn St., Chicago, Ill.
 Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill.
 Best Devices Co., 1514 Prospect Ave., Cleveland, Ohio.
 Duplex Machine Co., 316-75th St., Brooklyn, N. Y.
 Electrical Prods. Corp., 1122 W. 16th St., Los Angeles, Cal.
 Lang Mfg. Works, Olean, N. Y.
 Neumade Products Corp., 249 W. 47th St., New York City.
 Stern Metal Works, 1006 Vine St., Philadelphia, Pa.

Rheostats

Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
 Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
 Cuttler Hammer Mfg. Co., Milwaukee, Wis.
 Duplex M. P. Industries, Inc., Long Island City, N. Y.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly Co., 129 Grand St., New York City.
 Hertner Electric Co., 1900 W. 112th St., Cleveland, Ohio.
Hoffman & Soons, 522 First Ave., New York City.
 Hub Electric Co., 2219 Grand Ave., Chicago, Ill.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
 Leonard Electric Mfg. Co., 3709 Perkins Ave., Cleveland, Ohio.
 Newton, Chas. I., 331 W. 18th St., New York City.
 Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
 Wheeler-Green Electric Co., 29 St. Paul St., Rochester, N. Y.

Manufacturers**Screens**

American Silversheet Co., 915 Washington St., St. Louis, Mo.
 Da-Lite Screen Co., 922 W. Monroe St., Chicago, Ill.
 Diamond Screen Products Co., 1222 Ontario St., Cleveland, Ohio.
 Gardiner Co., L. J., 1021 W. Goodale Blvd., Columbus, Ohio.
 Minusa Cine Screen Co., 2665 Morgan St., St. Louis, Mo.
 Mirror Screen Co., Shelbyville, Ind.
 National Screen Co., 2100 Payne Ave., Cleveland, Ohio.
 Premier Screen Co., P. O. Box 861, Roanoke, Va.
 Raven Screen Corp., 1476 Broadway, New York City.
 Rembusch Screen Co., Shelbyville, Ind.
 Royal M. P. Screen Co., 910 Manhattan Ave., Brooklyn, N. Y.
 Spencer Lense Co., 442 Niagara St., Buffalo, N. Y.
 Story Scenic Co., 21 Tufts St., Somerville Sta., Boston, Mass.
 Trans-Lux Daylight Picture Screen, Inc., 247 Park Ave., New York City.
 Walker Sunlight Screen Co., 359 Canal St., New York City.
 Werstner & Son, C. S., 211 N. 13th St., Philadelphia, Pa.
 Western Shade Cloth Co., 22nd and Jefferson Sts., Chicago, Ill.

Slides

Acme Slide Studio, 1026 Market St., San Francisco, Cal.
 American Slide Co., 165 No. High St., Columbus, Ohio.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Excelsior Illustrating Co., 219 Sixth Ave., New York City.
 Kansas City Slide Co., 1015 Central St., Kansas City, Mo.
 Lochran, Wm. A., Film Exchange Bldg., Minneapolis, Minn.
 Midland Cine Products Co., 706 First Ave., North Minneapolis, Minn.
 Milano Slide Co., 112 W. Broadway, Salt Lake City, Utah.
 Niagara Slide Co., Lockport, N. Y.
 Paramount Publicity Corp., 111 Westchester Sq., Bronx, N. Y.
 Radio Mat Slide Co., 167 W. 48th St., New York City.
 Ransley, J. F., 337 Madison St., W. Chicago, Ill.
 Standard Slide Co., 209 W. 48th St., New York City.
 Unique Slide Co., 168 W. 48th St., New York City.
Victor Animatograph Co., Davenport, Iowa.

Tachometers

Weston Electric Instrument Co., 4 Weston Pl., Newark, N. J.
 Blanchard Instrument Co., Cambridge, Mass.
 Consolidated Instrument Co., 41 E. 42nd St., New York City.

Meters, Electrical

Weston Electrical Instrument Corp., 7 Weston Pl., Newark, N. J.
 Jewell Electrical Inst. Co., 2 Vesey St., New York City.

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PROJECTION - Yesterday, Today and Tomorrow

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and determine by casual observation of the screen which projectionist is on duty at the time. What I do mean is that if a projectionist of ability and skill and with a natural aptitude for the art is in charge of, or has supervision over, the projection room and is endowed with the faculty for developing the latent talent in his subordinates, then he can just as definitely build his personality into the picture as the musical director can build his into the orchestra.

Intelligence Necessary

This illustrates the importance of the personal equation in the projection room, the value of which has seemingly been generally underestimated by all except the most astute managers. Expert projectionists and supervisors of projection can not be turned out by any rule of thumb, laboratory, class room nor yet alone by practical experience in the field, itself. Of course, the basis of the qualifications for the expert projectionist is intelligence, and it is a sad commentary on things in general and projection in particular that conditions have been permitted to exist which have tended to greatly discourage the really intelligent man from entering this craft as a means of livelihood. Projection, in a short time, is most certainly going to require \$10,000 a year men, and where are we going to get them?

Manufacturers Aid

Projectors and lens manufacturers are now in a position to supply the projectionist with equipment which will enable him to get the utmost out of the present two-dimension picture. More important, still, the exhibitor is beginning to realize the necessity for expensive projection equipment and high grade lenses and is willing to buy them. A great step forward has been made by several exchanges in their method of checking the condition of their film, thus assuring that prints delivered to the projectionist are in proper condition for projection. The work of the Paramount exchanges along these lines has been especially notable and deserves the hearty appreciation of the industry as a whole. The effects of this work will be far reaching.

The Future

These, and many other things, are indications of the change that is taking place in the standard of projection as practiced in this country. The possibilities in this field are now attracting the favorable attention of the college trained man, and unless the average projectionist now employed in this work lays out for himself, and adheres to, an immediate and intensive course of study and application along technical lines, he will awake some day to discover that the whole structure of the craft has changed over night and that he is still living in the yesterday.



Shipping can in battered condition with new labels lost among old ones—an untidy, careless handling in the exchange. This malpractice is being done away with rapidly by progressive exchanges.



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RATES PER LINE OR INCH ON APPLICATION

FOR SALE—Simplex projector in good running condition. Cheap. Write Box 1, Motion Picture Projectionist.

FOR SALE—Projector still in use. Wish to buy new one so will sell reasonably. May be seen in New York. Address Motion Picture Projectionist, Box 4.

FOR SALE—Dismantling theatre. Will sell complete projection equipment or in part at once. Will accept time payments from reliable buyer. Write Motion Picture Projectionist, Box 3.

WANTED—Dealer seeking second-hand projection machines or parts to resell. Write Box 6, Motion Picture Projectionist.

THIS PAGE will be used to advertise *Equipment for Sale—Equipment Wanted*, and all other information desired to be passed on or received-to and from manufacturer, dealer and Projectionist.

More Comments By Our Readers

We received your magazine some few days ago and will state that it exceeded our expectations by far and it is one of the best craft magazines that I have ever read.

To show our appreciation of a magazine of this type, I am inclosing check to cover every projectionist in our local.

We are all looking forward to the next issue, knowing that it will even be better than the first issue.

Trusting that you will receive many other letters of this sort and with the best of wishes to yourself and our new publications, I am,

C. K. PETERS, JR.
Sec.-Treas. Local 548,
Greenville, Texas

This magazine is the very best thing I have seen for our craft and too much cannot be said about it. I am sure that this Local will subscribe for it 100 per cent. In my estimation it is first hand information at very small cost. I would not be without it.

E. G. BARNETT,
Secretary.

Local 631,
Orlando, Florida.

THE MOTION PICTURE PROJECTIONIST has my approval.

E. S. FOWLER,
Secretary.

Local 189,
Alliance, Ohio.

Am greatly surprised with THE MOTION PICTURE PROJECTIONIST. We surely are greatly in need of a magazine of this type and I can see no reason for its not being a great success. I am sure that we will all subscribe 100 per cent.

A. A. FIDLER,
Secretary.

Local 414,
Wichita, Kansas.

After going through THE MOTION PICTURE PROJECTIONIST I can see that the Projectionists of the United States and Canada are going to have a magazine that was worth while waiting for.

RALPH E. JOHNSON,
Secretary-Treasurer.

Local 221,
Aurora, Ill.

Can I congratulate you on the splendid magazine that this first issue is and assure you, both as a manufacturer and projectionist, that it fills a Long-felt-want. As a projectionist of 18 years experience, no one knows better than myself how necessary it is to tell your message to the men in the projection room and how much they have to say in the final purchase of any product that they must work with.

So as a manufacturer who realizes the truth of the above, will you please send me a rate card.

I wish the projectionist the best of success which I know it will enjoy.

L. D. STRONG,
Essanay Electric Mfg. Co.,
1012 S. 10th Ave.,
Maywood, Ill.

Having read the first edition of your magazine and finding it very interesting and to the satisfaction of myself in finding a long needed medium for our profession, I enclose check to cover my subscription and wish THE MOTION PICTURE PROJECTIONIST the success it is due and will surely receive.

LAWRENCE J. KATZ,
Secretary-Treasurer.

Local D4,
Harrisburg, Penn.

Our members express great enthusiasm in your magazine as they think it covers their work very well. Please accept our best wishes for your paper.

L. RAY GRIGE,
Secretary-Treasurer.

Local 602,
Trinidad, Colo.

Inclosed herewith are subscriptions.

Also let me thank you for the copies sent to me and I think your first edition was very good. I want to make our local 100% for you.

signed,
JACK EBERLY, JR.,
Plainfield, N. J.
Secretary Local 485,

The boys to whom I have shown THE MOTION PICTURE PROJECTIONIST declare it the "stuff". I am sure they will all want the magazine.

T. W. McMAHON,
Secretary.

Local 625,
Tyler, Texas.

I think the magazine will be great. Of course everyone here realizes that the first issue is nothing to what it will be in the future. It's just what we have been waiting for in this country, a Projectionist magazine by Projectionists and for Projectionists. Yours for great success.

AL H. STINE,
Secretary.

Local 533,
Frederick, Md.

I have at hand the first issue of THE MOTION PICTURE PROJECTIONIST and am impressed by its excellence. Please accept my hearty congratulations.

ALFRED L. CRISWELL,
Secretary.

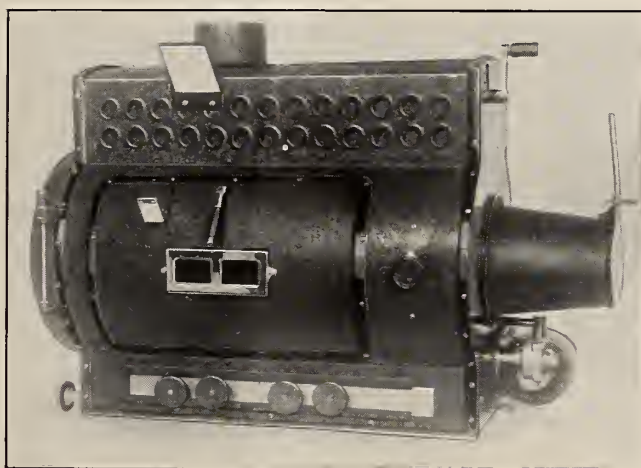
Local 171,
Pittsburgh, Pa.

EXTINGUISHERS

EACH projection room should be equipped with fire extinguishers and so located that they are in easy reach at all times but the fire extinguisher is of no use unless it is kept charged. Although fire extinguishers may have never been used, they should be inspected and recharged at least every six months. In addition to the fire extinguishers, each projection room should contain at least one bucket of sand and one bucket of water, using the standard round bottom fire buckets and buckets plainly marked showing contents. These buckets should be hung side by side on standard wall fire hooks about four feet from the floor in the most accessible location.

Announcing the **H & C** Inc. Type H. I. R.

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The latest and greatest step forward in the development of High Intensity projection.

Snow White High Intensity Light.

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Economical to operate.

Even screen illumination.

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MEN like Cameron, Dennison, Richardson and others who have had so much to do with the striking scientific development of the motion picture art have unqualifiedly endorsed the SENTRY SAFETY CONTROL.

They analyze it from two viewpoints—the human and the scientific. They see that it not only insures complete safety for the projectionist and the audience, but they also see that by removing the worry of fire from the projectionist's mind they leave him free to give his complete attention to securing perfect projection for the photoplay.

The SENTRY SAFETY CONTROL marks an important point in the forward-march of motion picture science. Years hence, looking backward, it will be hailed by projectionists as one of the epoch-making aids toward the recognition of their craft.



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**CAN BE ATTACHED TO ANY PROJECTOR
COSTS ONLY A FEW CENTS A DAY**



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THE MOTION PICTURE

PROJECTIONIST

A Message From
The International President

Selling The Projectionist

To The Public

Commutator Troubles

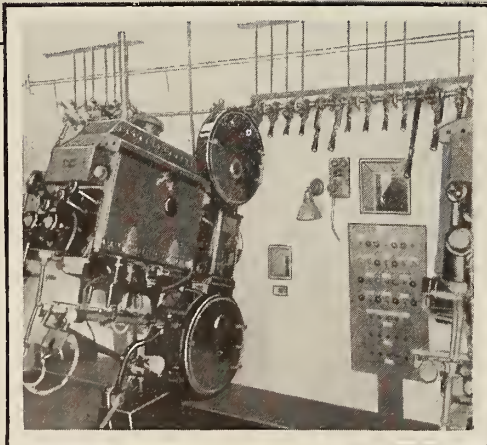
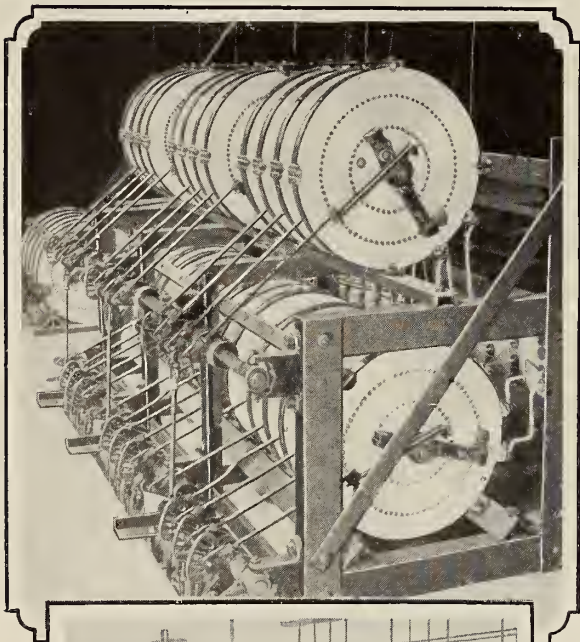
By Charles Bayer

Radio Movies and the Theatre

By C. Francis Jenkins

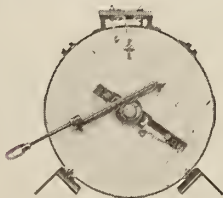
Control - Capacity and Unit Spacing

Ward Leonard - Vitrohm Dimmers



Vitrohm Dimmers mounted over projection room control all house lighting effects. [Upper illustration]

Handles providing control by operator of dimmers mounted over projection room. [Lower illustration]



Vitrohm Dimmer Plate—embodies more than 34 years of resistor experience.

WHEN the owners and designers of theatres discuss lighting control apparatus they are interested entirely in results which necessitate a "control" system that will be dependable and accurate.

Apparatus employing Ward Leonard Vitrohm Dimmers is most frequently specified for these important installations. Here are some of the reasons.

Vitreous Enamel Insulation.

110-step control, all steps equally effective in even, flickerless light reduction.

Greater lamp "watt" capacity for space occupied.

Unit space engineering, each plate in the dimmer bank immediately replaceable by one of a different capacity to compensate for load changes.

Continuous duty operation at full rated load on any step without excessive heating.

Dimmer units enabling banking to any desired capacity.

All moving parts, including contact buttons, ground or machined, thus insuring smooth action.

Resistive element of plates permanently and completely protected from disintegration.

Cost of systems employing Vitrohm Dimmers the same or less than that of other equivalent lamp "watt" capacity systems.

Only in vitreous enamelled Ward Leonard Vitrohm Theatre Dimmers are all of these essential features found. Send your dimmer specifications to us for estimate. 25 years of manufacturing and research experience is fully at your disposal.

Ward Leonard Electric Company

31-41 South Street

Mount Vernon, N. Y.



Switchboard controls stage lighting. Note space at right of Vitrohm Dimmer bank for future additions.



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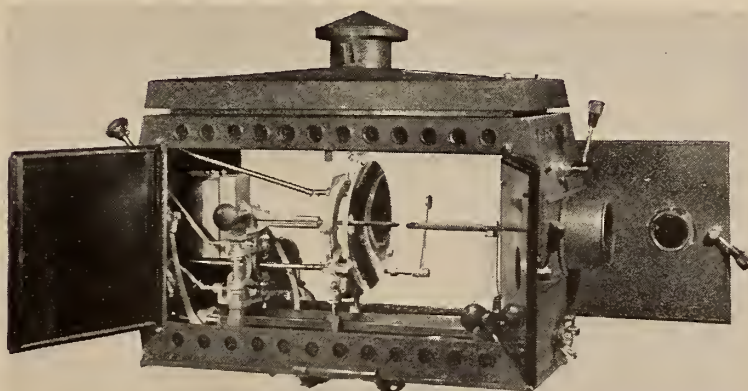
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600 WEST 57th STREET NEW YORK CITY, N. Y.

Announcement

To conform with the general publishing practice of publishing a monthly magazine on the 20th day of the month preceding the date of issue, this issue of THE MOTION PICTURE PROJECTIONIST has been dated January, instead of December. This advance dating will in no way affect the date of expiration of any subscription, these simply being extended an additional month. In future, then, subscribers will receive their copies on the 1st of each month.



All communications should be addressed to THE MOTION PICTURE PROJECTIONIST and not to individuals. Checks, money orders, and the like should be made payable to THE MOTION PICTURE PROJECTIONIST and not to individuals. Your cooperation in this respect will be appreciated.



The present subscription rate of \$1.50 per year will continue in effect until March 1, 1928, after which date it will be advanced to \$2.50. Subscriptions received at this office on or before March 1 will be accepted at the old rate. Prospective subscribers are urged to act quickly and take advantage of the lower rate.

THE MOTION PICTURE PROJECTIONIST

45 West 45th Street
New York City, N. Y.

Can You Solve This Problem?

Submitted by Max Hollander

Local 306

In Paterson, N. J., while traveling with the Lyman Howe troupe, I was approached by the manager of the local theatre with the request that I go over to his theatre and endeavor to determine why one of his projectors projected a brighter light than the other.

Stimulated by his offer of \$25 if I succeeded, I consented to try. Accordingly, after the Howe show had ended I went to the local theatre, and there I found the following conditions: There were two Powers machines, both equipped with 4-inch Bausch & Lomb lenses, with condensers 6½ in. x 7½ in., two Fort Wayne compensars, operating on 110-volt A.C. current, with the am-meters registering 90 amperes.

The manager informed that he had had many projectionists look over the machines, but to no avail. Finally, in desperation, he had called in an "expert" from New York, a person who titled himself "Doctor of Projection." The "Doctor" came in, looked over the machines, after which he decided that \$500 worth of new equipment was needed. The equipment was bought, added to the machines—but one machine still projected as poor a light as before. The \$500 was spent for new lenses, new sets of condensers, compensars, different make of carbons, and the installation of a line of No. 00 wire from the booth to the stage.

I began my task at about 11 A. M., and at 3 A. M., after going over both machines and making numerous tests, I still was as far from the solution as when I started. I had made all the changes, examinations and tests that one would probably try under the circumstances, yet the trouble remained.

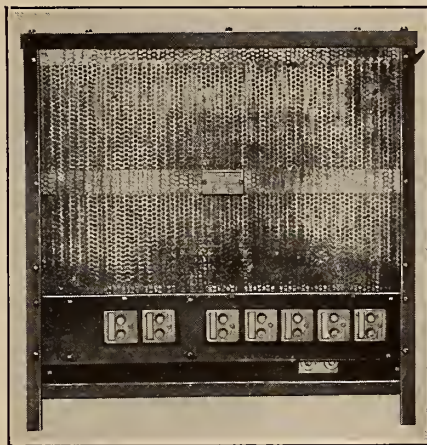
I was about to give up in despair when suddenly, by chance, I discovered what the trouble was.

What was the trouble?

[To the Reader: Read Mr. Hollander's problem over again carefully. Send in your answer as early as possible. Correct answers will be published along with your name. Try it.—The Editors.]

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is the representative theatres which have installed them



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| Astor Theatre | | New York City |
| Proctor's 86th Street | | New York City |
| Cohan Theatre | | New York City |
| Publix Theatre | | Buffalo, N. Y. |
| New Capitol | | Binghamton, N. Y. |
| Keith's Theatre | | Philadelphia |
| Carman Theatre | | Philadelphia |
| Proctor's Theatre | | New Rochelle, N. Y. |
| Proctor's Theatre | | White Plains, N. Y. |
| Oriental Theatre | | Detroit, Mich. |
| Fox's Theatre | | Washington, D. C. |

| | |
|---|-----------------------|
| Keith's Circuit | Loew's Circuit |
| Big Parade—Road Shows | Beau Geste—Road Shows |
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| Simplex Division, International Projector Corp. | |
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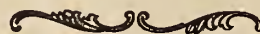


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THE MOTION PICTURE PROJECTIONIST

"A Magazine Devoted to Projection and Projectionists"

JANUARY 1928

Founded 1927

VOL. 1, NO. 3

JAMES J. FINN, *Managing Editor*

LESTER B. ISAAC }
FRANK R. DAY { *Associate Editors*

EARL J. DENISON, *Advisory Editor*

Editorial and Advertising Offices

45 WEST 45TH STREET
NEW YORK CITY

Editorial and Advertising Representatives in the key Cities of the United States and Canada will be announced in forthcoming issues.

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THE MOTION PICTURE PROJECTIONIST assumes no responsibility for the damage or loss of manuscripts, photographs or drawings submitted for publication, although due care will be taken to insure safety. Full postage must always be sent with the material submitted in order that it may be returned if it is unavailable.

SUBSCRIPTION RATES

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In This Issue—

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Has The Development of Projection Lenses Stopped?

WILBUR R. RAYTON

You Are The Show..... HARRY RUBIN

REGULAR DEPARTMENTS

What Projectionists Are Doing

The Readers Have a Word to Say



Special Blue Print Section

Manufacturers and Dealers Index

Note: The Motion Picture Projectionist does not assume responsibility for the statements and opinions appearing in signed articles in its columns. The leading experts in each phase of projection are asked to contribute and they are free to express their own theories and experiences. Accuracy alone is insisted upon.

A Message from the INTERNATIONAL PRESIDENT



| | | | |
|---|--|---|--|
|  INTERNATIONAL ALLIANCE OF THEATRICAL STAGE EMPLOYES AND MOVING PICTURE MACHINE OPERATORS OF THE UNITED STATES AND CANADA, 1440 BROADWAY, NEW YORK CITY, N. Y. <small>Affiliated with the American Federation of Labor</small> | |  | |
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TELEPHONE PENNSYLVANIA 11944

New York, N. Y., December 8, 1927

Editor,
The Motion Picture Projectionist,
45 West 45th Street,
New York, N. Y.

Sir:-

I have read the first issues of The Motion Picture Projectionist, and I wish to express to you my congratulations on a job well done. I consider your magazine the finest of its kind I have ever seen, and you are to be commended for your efforts in providing projectionists with such a splendid craft journal.

Containing, as it does, a wealth of information and instruction for projectionists everywhere, and compiled, edited and published in such workmanlike fashion, I am sure that your magazine will receive the support it so richly merits.

Please accept my best wishes for success in your ventures.

Very truly yours,

Wm F Canavan
International President

WFC:H
ES&AU
12848

"The
finest
magazine
I have
ever
seen"

Generators

Common Generator Troubles May Be Avoided by Ordinary Care—Some Remedies That Can Be Easily Applied

By James R. Cameron

Author and Expert on Projection

A break in an armature must be located by the fall-of-potential method, which means that a current must be sent through the armature and the voltage tested across the various segments. First, disconnect all the leads from the armature and lift all brushes except one on each pole; then connect the battery to these brushes through the resistance and ammeter shown in Fig. 1, connect the detector to one brush, and then to each segment in turn with a wire from the other terminal of detector until the break is located.

If the two wires from the detector are connected to the segments upon which the brushes are standing, a deflection will be seen, caused by a fall of voltage through the coils. If we gradually draw the movable wire over the segments toward the other brush, the deflection will gradually fall to zero, providing it is on the side on which the break does not occur (Fig. 1). If, however, the wire is drawn over the segments on the other side, the deflection on the instrument will remain constant until the failing segment is reached, when the deflection will drop to zero as the wire passes over the break.

Instead of moving the testing wire around the commutator, a course that might not always be convenient,

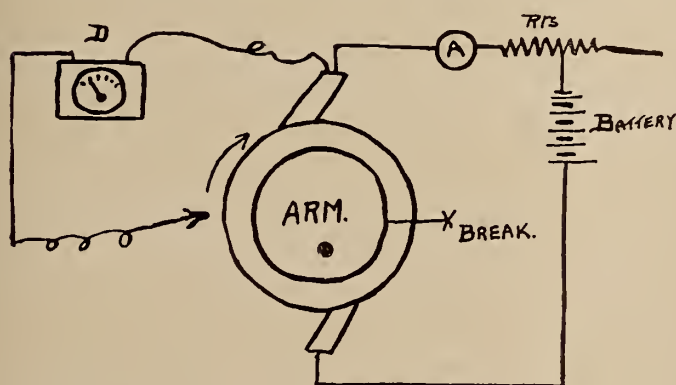


Fig. 1

it could be held stationary against the commutator, say, a few segments from one of the brushes, and the armature gradually pulled around until the break appeared.

In this case, on the unbroken side a constant deflection will be obtained until the break passes a brush, when the needle will fall to zero. On the other side there will be no deflection until the break passes one of the brushes. So long as the break is between the movable testing wire and the brushes to which the detector

is connected, there is a deflection; but not when the break is between the fire brushes and the testing wire. If the instrument gives a good reading between two adjoining segments, it will show a much larger reading across a break.

If the millivoltmeter is available, the matter is some-

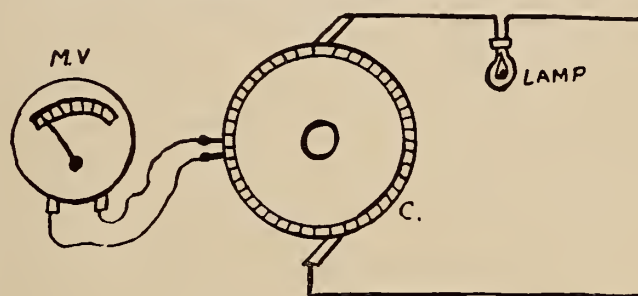


Fig. 2

what simplified, as a small current is sufficient for testing, such as, for instance, the current taken by an incandescent lamp. If, therefore, the armature be connected to a source of supply through a lamp, a millivoltmeter will give a good deflection across a break. Millivoltmeter is the instrument used as a shunted ammeter in conjunction with various low resistances called shunts; when used as a millivoltmeter in the manner described above, it is used alone, the armature itself taking the place of the shunt (Fig. 2).

Having found the broken section, it must be examined until the actual break is discovered. In the case of a winding, the bad section can be taken out and a new one put in without much difficulty. In the case of a formed wound drum, it is generally an inaccessible bottom wire that breaks, in which event it is usual to strip the armature until the break is reached. Having found the defective section, cut out as much as can be got at, that is, the conductors on the surface of the core or in the slots. Leave the end crossing wires in, but with the ends separated, and rewind the section with the end crossings on top of the others.

Overheating the Armature

Several things will cause overheating of the armature, the most common being an overload, grounds, eddy currents in the core, eddy currents in the conductors, short-circuit in the coils, sparking at the commutator, heat conducted from the bearings, and low

(Continued on page 30)

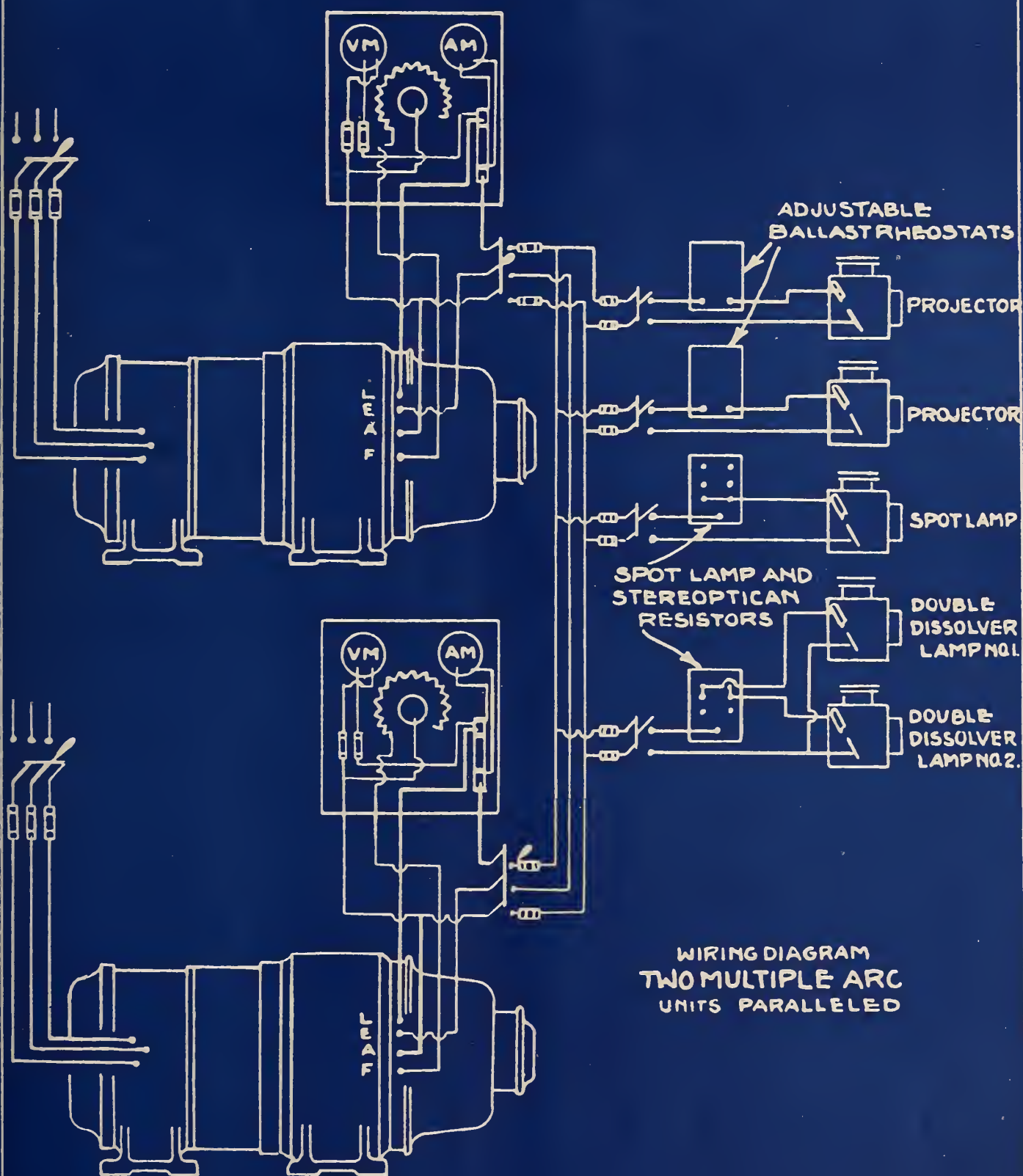
| MULTIPLE ARC TRANSVERTER RATINGS | | | | | | | | | | |
|----------------------------------|-----------------|------------------|-------|----------------------|----------------|-------|----------------------------|-------|---------|----------------------|
| TYPE | GENERATOR | | | | MOTOR | | | | | |
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| MA-1-40-80 | 40 | 80 | 80 | 1750 1450 1160 | 8 | 1 | 60 or 30 50 or 25 40 | 220 | 40 | 1750 1450 1160 |
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| MA-60-120 | 60 | 120 | 85 | 1750 1450 1160 | 12 | 3 | 60 or 30 50 or 25 40 | 220 | 30 | 1750 1450 1160 |
| MA-80-160 | 80 | 160 | 85 | 1750 1450 1160 | 16 | 2 | 60 or 30 50 or 25 40 | 220 | 36 | 1750 1450 1160 |
| MA-80-160 | 80 | 160 | 85 | 1750 1450 1160 | 16 | 3 | 60 or 30 50 or 25 40 | 220 | 40 | 1750 1450 1160 |
| MA-100-200 | 100 | 200 | 90 | 1750 1450 1160 | 20 | 2 | 60 or 30 50 or 25 40 | 220 | 46 | 1750 1450 1160 |
| MA 100-200 | 100 | 200 | 90 | 1750 1450 1160 | 20 | 3 | 60 or 30 50 or 25 40 | 220 | 50 | 1750 1450 1760 |
| MA-125-250 | 125 | 250 | 90 | 1750 | 25 | 2 | 60 | 220 | 57 | 1750 |
| MA-125-250 | 125 | 250 | 90 | 1750 | 25 | 3 | 60 | 220 | 63 | 1750 |
| MA-150-300 | 150 | 300 | 90 | 1750 | 30 | 2 | 60 | 220 | 67 | 1750 |
| MA-150-300 | 150 | 300 | 90 | 1750 | 30 | 3 | 60 | 220 | 75 | 1750 |
| MA-200-400 | 200 | 400 | 100 | 1750 | 40 | 2 | 60 | 220 | 90 | 1750 |
| MA-200-400 | 200 | 400 | 100 | 1750 | 40 | 3 | 60 | 220 | 100 | 1750 |

THE HERTNER ELECTRIC CO.,

Cleveland, Ohio, U.S.A.

697

PUBLISHED BY THE MOTION PICTURE PROJECTIONIST JANUARY 1928



WIRING DIAGRAM
TWO MULTIPLE ARC
UNITS PARALLELED

You Are The Show

and Most Important Cog in the Theatre

By Harry Rubin

Supervisor of Projection, Publix Theatres

A NOTED showman recently made this statement: "The show is the motion picture feature; projection is the show, and therefore the projectionist really is the show."

If projectionists would incorporate this thought in their attitude toward their daily work, the craft would benefit greatly. There is absolutely no doubt in my mind that the projectionist is the show, but I doubt whether a majority of projectionists, however much they may realize their importance in the theatre, regard their position in precisely the same terms as I do.

The importance of the projectionist in the theatre has often been stressed by the manufacturers by means of a catch-line in their advertisements; various speakers have mentioned it, and our Local officers have insisted upon it. But, as a rule, we projectionists really don't think enough of ourselves as craftsmen.

Let's sell ourselves the idea of our own importance. We are the show, and the sooner we awaken to the fact the better.

We all have heard at one time or another of the power of the projectionist to "either make or break the show." And this saying is literally true; the projectionist holds the most important post in the theatre, whether the theatre be on Broadway or on Main Street.

I am sure that orchestra conductors, as they mount the stand, preparatory to bringing forth with a wave of their batons the first notes of any composition, do so with a keen desire to give the composition the best possible rendition. But what of the picture that comes to us in so many reels of celluloid, so many metal boxes? Is it not possible that occasionally there rests in these boxes the symphony in celluloid of someone as much of an artist in his own field as any musical composer is in his? And who is there to see to it that this length of celluloid receives the same advantageous presentation as that accorded a musical composition by a conductor, the same earnest striving to bring out the best there is in the picture that the conductor exercises to bring out the hidden beauty of a symphony? The answer is, the projectionist.

The comparison drawn above is a happy one. I consider the projectionist as much of an artist as any orchestra conductor. The latter is commonly thought of as an artist; but did you ever hear of a projectionist being called an artist? Rarely, if ever. Yet I maintain that projectionists are as deserving of the title as conductors. But why aren't we called artists?

That long sweep of the arm, that quivering of the baton, that straining on tiptoes, is not a part of the conductor's physical culture course. It is a sincere effort



Harry Rubin

to express the feeling that is within him, the striving to attain the best possible results. And now we come to the heart of this article: A projectionist should work with feeling. Hokum, you say? Not at all.

The world of the theatre is the world of illusion. Silence spells the perfect show. The audience must be held under the spell of the illusion. Your job—and a mighty big one it is—is to do nothing that may tend to destroy that illusion.

When you have threaded-up your projector, seen that everything is in proper working order and are prepared to give your show, your job is far from done. And this is where my reference to working with feeling comes in. In order not to destroy the illusion you must give a *perfect* show. And a perfect show means, among other things, the proper speed, unvaryingly maintained; perfect changeovers, no flicker, the proper amount of light, evenly distributed; lenses in focus, and a constant watchfulness over everything. And it is also part of your

(Continued on page 30)

Has Development of PROJECTION LENSES Stopped?

*Patents Show Inventors Seek to Reduce Manufacturing Costs,
Not to Improve Performance*

By Wilbur R. Rayton

Scientific Bureau, Bausch & Lomb Optical Co.

THE lenses used for the projection of both lantern slides and motion pictures are unique in the realm of optical instruments in their apparent insusceptibility to marked improvement. Within the last fifty years no kind of lens or other optical instrument has failed to receive the meticulous scrutiny of experienced and ingenious designers, with a result which is a record of more or less continuous improvement.

In projection lenses, on the other hand, there are two standard types which, although one of them is almost as old as photography and the other is beginning to assume an air of respectable old age, appear to meet the requirements of all kinds of projection in a fashion so satisfactory that noteworthy improvements have seemed to have been impossible. The records show not more than seven or eight patents granted on lenses said to be designed for projection, and many of these admit reduction of cost rather than improved performance to have been the principal object of the invention.

The two types of lenses referred to are the Petzval portrait lens and the triplet construction due to H. Dennis Taylor. The first was announced in 1840, the second in 1895. The general type of the first is shown in Fig. 1, and of the second in Fig. 2. It is of no interest here to record the details of construction of these lenses and in fact impossible; for probably every manufacturer uses formulae for his lenses peculiar to himself, none of which are exactly like the original Petzval construction or like any of the originally published triplets of Taylor.

Within a comparatively few years after its birth the original Petzval form was subjected to modification by Dallmeyer, Voigtländer, and Zincke-Sommer. These modifications have become classic lens forms, but there

have been scores of other modifications which have never been honored by special mention, nor have they deserved it, for they have not represented any sufficient degree of originality. Later on in this article reference will be made to some fairly recent lenses which at first glance appear to differ considerably from the Petzval form, but which, on closer inspection, are seen to be closely related to it.

It appears to be pretty certain that the first commercial motion picture projectors sold in America were provided with Petzval lenses made by the company with which the writer is now connected, and the same type is now used almost universally for the projection of motion pictures and to some extent for the projection of lantern

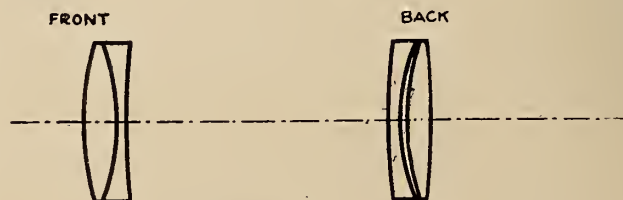


FIG. 1—Petzval Portrait Objective.

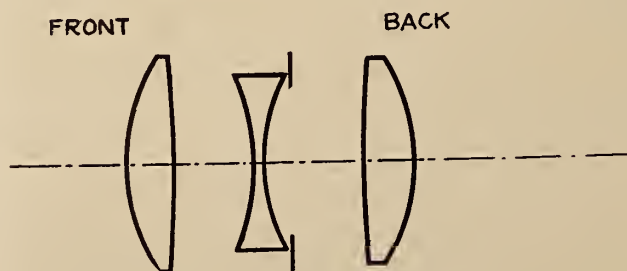


FIG. 2—Taylor Triplet.

* From the Transactions of the S.M.P.E. with permission.

slides. For the latter form of projection, however, and for the projection of opaque objects by means of reflected light, the triplet lens is better adapted and possibly less expensive. Of these three kinds of projection, the last is the most remote from the interest of motion picture engineers, and, while interesting enough from the standpoint of the demands it makes on the projection lens, will not be discussed further here.

The reasons why these two types of lenses are pre-eminently suited to these two respective kinds of projection are not difficult to find. Motion picture projection in the average theatre is a problem of projecting a picture which is small relative to the focal length of the lens but which must be magnified to a degree which can reasonably be called enormous and yet with sharp definition, and with all the brilliance of illumination possible.

In respect of magnification of the image, the projection lens is subjected to much more severe strain than the ordinary photographic lens. Consider the case in which we are projecting a film with a lens of 6-inch focal length and with a throw of 120 feet leading to a projected picture approximately 20 feet long. Viewed from the position of the projector the image on the screen would subtend exactly the same angle as the film would appear to subtend to an eye located 6 inches from it. Compared with the size of the picture as viewed from the projector, at 60 feet from the screen it would appear twice as large; at 20 feet six times as large. In other words, at 20 feet from the screen the picture would look 6 times as large as would the film held six inches from the eye. A photograph, on the other hand, taken with a 6-inch lens would more likely be viewed at a distance of 12 inches or thereabouts so that, in comparison to the test to which an ordinary photographic objective is put, the projection lens in this hypothetical case is subjected to a strain no less than twelve times as severe.

It is evident, therefore, that the lens which can successfully project motion pictures must have the finest definition possible. On the other hand, the field of view which must be covered is much smaller than in ordinary photography. The long side of the film aperture subtends an angle somewhat less than 10 degrees for a projection lens of 6-inch focal length, while a photographic objective of the universal anastigmat type may be called upon to cover a field five times as great.

In addition, however, to this requirement of extraordinarily fine definition, there is the further requirement of high illuminating power. Now this property of the lens is gained by making its aperture large in comparison with its focal length within limitations which will be mentioned later. This practice, in all lens construction, leads to deterioration of definition because of the defect known as spherical zones.

While it is generally possible to cause the light which, coming from any given object point, passes through the marginal zone of the lens, to unite in the same image point as the rays which pass through the center of the lens, it is usually impossible to prevent the rays which pass through the intermediate zones from converging to points somewhat nearer the lens. The greater the aperture of the lens in comparison to the focal length, the more troublesome becomes this defect. The two requirements of the lens needed for motion picture projection are therefore mutually antagonistic. They are met, however, to the most satisfactory degree by the Petzval type of lens which is characterized by its very excellent definition over a small area, even when the aperture of the lens is nearly half its focal length.

In lantern slide projection, on the other hand, the magnification required is usually not more than one-third of that required for motion picture projection, and there-

fore the matter of high aperture is of relatively less importance. The field of view to be covered, however, is often larger. These requirements are better met by a lens of smaller relative aperture than the Petzval and one with considerably greater covering power, i.e., ability to form an image of satisfactory quality of a fairly extended object. Such a lens is the triple anastigmat. It performs excellently and is relatively inexpensive. It may be of interest, however, to point out that lantern slide projection from a projection room involves no greater angle of field of view than is required of the motion picture projection lens, and such projection is often satisfactorily accomplished with a single achromatic lens or a telescope objective.

Up to this point no reference has been made to the influence of the type of illumination employed upon the demands made upon the projection lens, but the implication was made a few minutes ago that it might not always follow that increased illumination would be gained by increasing the relative aperture of the projection lens. In fact, in order to insure that an increase in the relative aperture of the lens shall be effective, it is necessary to see that the aperture of the illuminating system be sufficiently large.

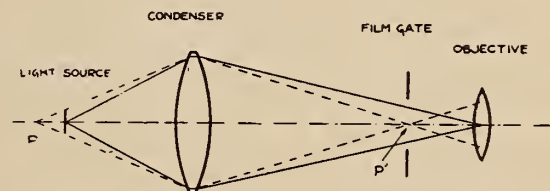


FIG. 3—Schematic Motion Picture Projection System.



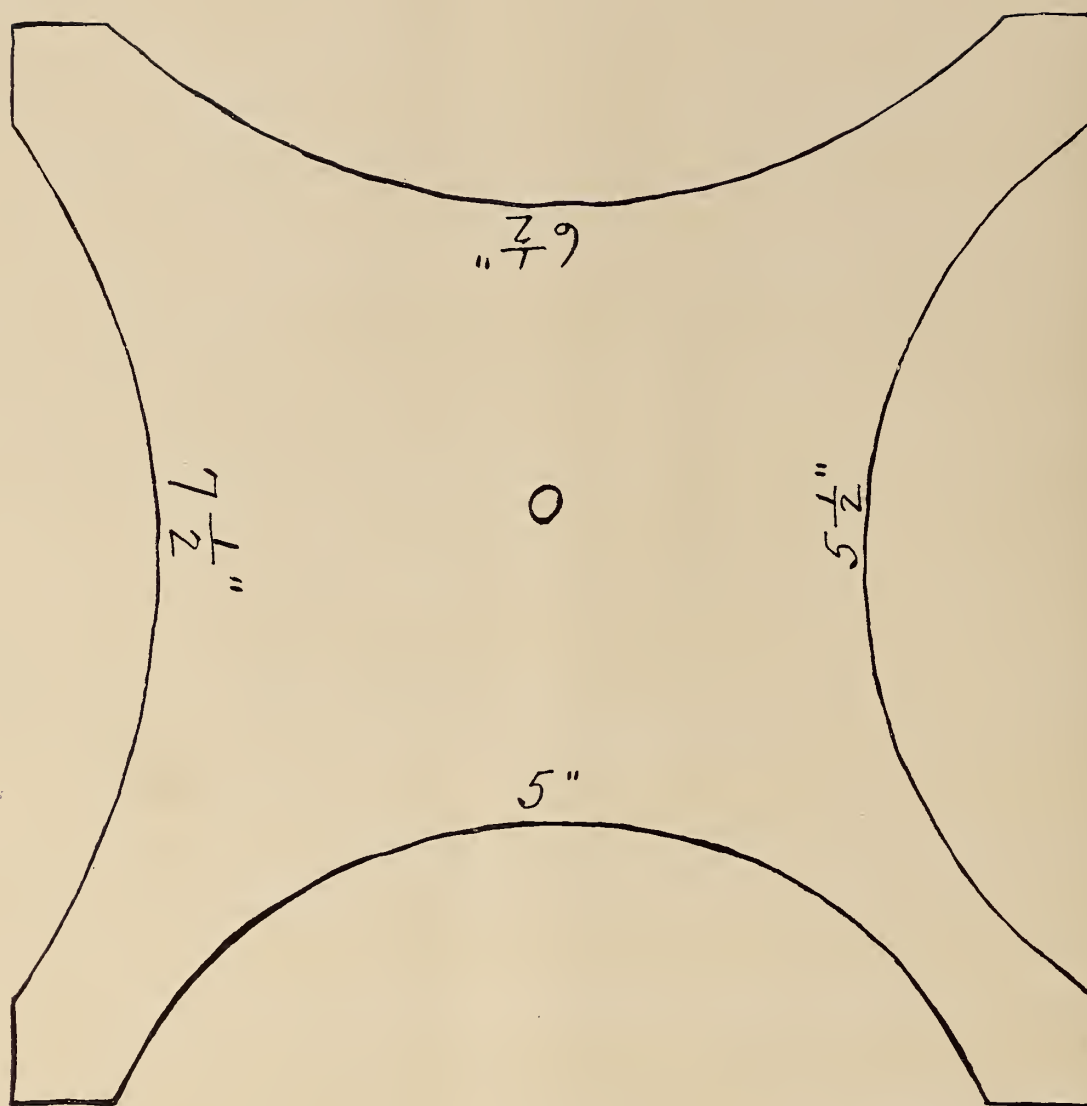
FIG. 4—Projection Objective with Short Back Focus.

In order to pursue this matter a little further, it will be convenient to introduce the expression "angular aperture." If an eye be placed at the center of the film gate and turned towards the objective, the largest circle of light visible subtends at the eye an angle which we call the angular aperture of the objective. Similarly, if the eye turns toward the illuminating system, the largest circle of light seen subtends at the eye an angle which is the angular aperture of the illuminating system. Now, insofar as the central point of the film gate is concerned, there is no gain in illumination if the angular aperture of the projection lens is increased to a value greater than the angular aperture of the illuminating system.

Now, the angular aperture of the illuminating system is a complex thing. In addition to the physical dimensions of the optical units of which it is composed, it depends upon the size of the light source and upon the location of the image of the light source with respect to the film gate. The illustration in Fig. 3 will help to illustrate this point. Here a motion picture projection system has been reduced to its lowest terms: the source of light, the condenser, the film gate, and the objective.

The solid lines limit the pencil of light which, originating in the central point of the light source, is converged by the condensing lens into an image in the plane of the objective. The dotted lines intersecting in the center of the film gate at the point P' measure the angular aper-

(Continued on page 22)



Condenser *Focus* Determiner

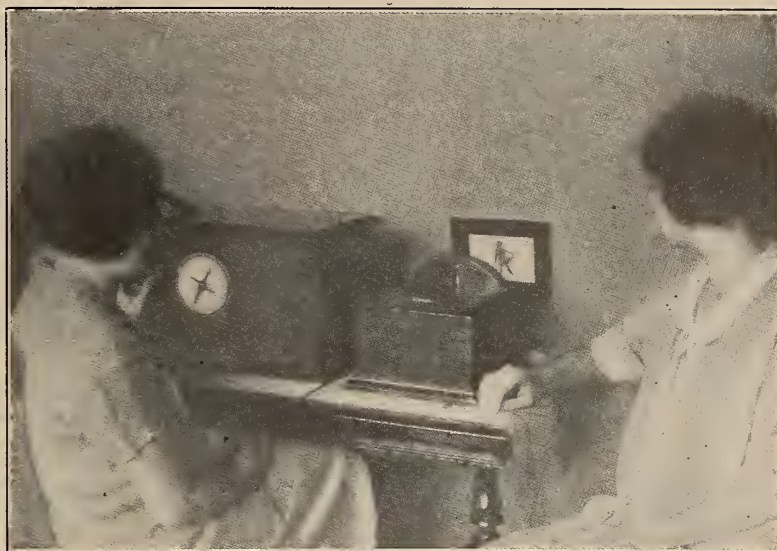
By Max Hollander

Local 306

Above appears a reproduction of a device for determining the size of a condenser. Detach this page, paste it on a cardboard, and then carefully cut out along the lines of the outline. Punch a hole through the center of the card, hang on a nail in your room, and you have a quick and easy method for condenser measurement.

The different curves of the cardboard which fit the convex side of the condenser determine the correct focal length in inches.

RADIO Movies



Radio Movies in the Home

and the Theatre*

By C. Francis Jenkins
Jenkins Laboratories, Washington

THIS is not a learned technical paper. I simply am going to tell you about some of the fundamentals of Radio Movies and Radio Vision for home entertainment.

And right here seems to be as good a place as any to begin standardizing the nomenclature of the new art. In our laboratory we say Radio Vision when we mean seeing by radio, just as it is now common practice to say radiophone and radiogram, when referring to communication by radio. When we speak of wire-carried service we say telephone, telegraph, and television. Such definitions not only seem logical, and are euphonious, but they greatly facilitate accurate understanding in discussion.

Similarly we say Radio Movies, when we speak of radio transmission from motion picture film, leaving the term Radio Vision to apply when we transmit directly from a person or a scene, although the same machine is used in receiving the picture from either source.

And perhaps I should begin my subject by saying that Radio Movies in the home will not hurt theatre patronage. On the contrary, Radio Movies will stimulate attendance at the regular picture theatre, for the analogous reason that the Victrola increased the number of grand opera patrons. Many of us came more intimately to know and to love the artists of the opera by familiarity with their personalities as recorded on Victrola discs.

And I remember how Mr. Johnson, of the Victor Company, begged the artists to permit him to carry the beauty of their talent to the far corners of the earth, appealing to their sympathy for the sick and shut-ins, and the lonely people of inaccessible places. Some artists entered the arrangement with misgivings, but to the astonishment of all of them their visible audiences increased with the popularity of their records, at the same time that their record royalties grew to exceed their income from grand opera engagements.

Incidentally, may I refer to the sale by Mr. Johnson,

a few months ago, of his talking machine interests for twenty-nine million dollars, at the end of twenty-nine years of belief in his idea.

Perhaps it is only incidental to my subject, but I make the observation that people generally fail to notice the fact that a new invention does not put an old device out of use. Every new invention finds its own field of usefulness while the old one gets added values in other lines. The coal oil lamp is generally assumed to have driven the candle out of use, yet ninety-five million gross of candles were sold in the year 1925.

The astounding increase in the use of electric light might reasonably be supposed to have put both oil, and its successor, gas, out of business. But oil was never before mined in such quantity, nor gas used in such volume as now. Oil made Ford a very rich man, because he built a machine to consume oil product, not as light but as power. Oil gave our sweethearts the beautiful tints they wear; made them beautiful so that we would love them; but left some of them dumb so that they would love us.

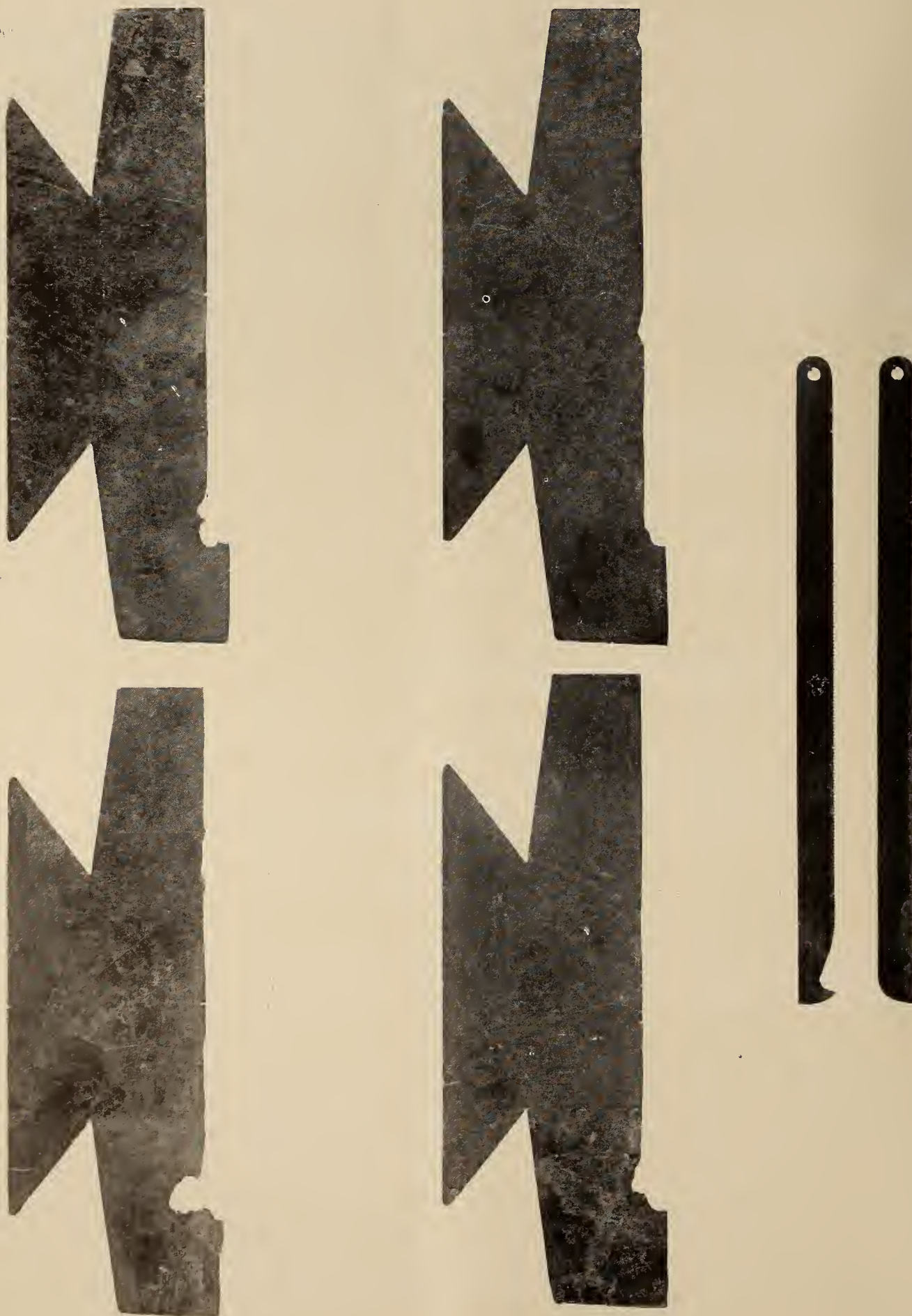
I think that some time I will write a thesis on this subject as touching working people, who too often fear new inventions will make living harder for them. In fact, it does just the opposite. Workmen burned up Compton's first power loom; destroyed Whitney's initial cotton gin; and broke up Howe's handmade sewing machine. It was a foolish thing to do, of course, for these inventions dress the workman better today than ever before, while he enjoys more conveniences and comforts. Why, even the cotton pickers now ride to the field "in ah Fode."

America as a workplace is the envy of the world, and all because America's inventions have doubled the workman's output, shortened his work hours, and given him more of what he buys with a day's work.

So go easy now, don't condemn Radio Movies; study the history of inventions instead. It isn't going to hurt

(Continued on page 31)

* From the Transactions of the S.M.P.E. with permission.



Above: Mica segments taken from damaged motors and generators, the effects of short circuits in the Commutator. *Below:* Two tools made from hacksaw blades for use in plugging a Commutator

Commutator TROUBLES

Proper Methods of Locating and Repairing

By Charles Bayer

Local 306

The following article is the first of a series on motor generators and kindred subjects prepared for THE MOTION PICTURE PROJECTIONIST by Mr. Bayer. The second will appear in the next issue.

Commutator troubles are more easily located than faults in an armature, but a repair job on an old-style D. C. motor or generator, many of which are still in use, is sometimes a trying and tedious operation.

The Cause

Sparking at the brushes is generally the first symptom of commutator trouble. One of the most frequent causes of sparking is a rough or pitted commutator. This may be the result of many irregularities, such as an overload, brushes out of line or not set at neutral points with a regard to the load, poor contacts, current density per square inch of brush contact too great, an open circuit, weak magnetic fields, commutator out of round, and high or low bars or high mica.

But the most common cause of sparking is high mica, which causes brushes to chatter and make poor contact. This condition results in a rapid blackening and burning of the bars, sometimes eating the copper away, leaving the mica segments standing out above the surface of the commutator. Some motors or generators seem to be particularly subject to this trouble, due to the fact that the mica is too hard a grade or the copper too soft. When there is no time to turn down the commutator, the high mica can be removed by grinding it down with a piece of sandstone and by using fine sandpaper for smoothing.

High Mica Troubles

High mica is often the cause of more serious trouble. The commutator may become so hot because of poor brush contact, that the solder will be melted and thrown out, resulting in short circuits between bars and open circuits due to armature leads being disconnected. About the only known permanent relief for sparking at the brushes caused by high mica is undercutting the mica. This remedy is recommended when it is reasonably certain that the high mica is caused by the natural condition of the copper or mica. If the trouble lies not in the condition of the copper or mica, then the trouble must be traced to some other source, otherwise undercutting the mica, while probably succeeding in improving somewhat the running condition, would fail to eliminate the cause of the trouble.

Great Care Essential

The mica should not be cut too deeply, a depth of $1/32$ to $1/6$ of an inch below the surface of the copper being sufficient. Great care must be exercised to remove the mica the full width of the segment, for if any



Charles Bayer

thin slivers are left flush with the surface they will defeat the purpose of the undercutting.

The method described above has often corrected some stubborn cases of sparking. And if the job is properly done, all that will be necessary to preserve sparkless commutation is to keep the slots clean and well below the surface of the copper.

Burn-out Between Bars

Probably the most frequent commutator trouble is a burn-out between bars. It occurs very often on the corner of the bars and is not infrequently caused by oil working along the shaft from the bearing and up onto the commutator. This oil collects dust and finally causes current to leak from one bar to the other. The mica then becomes carbonized, and a short circuit results. This is one of the causes of burned-out armature coils, and can be detected by a spark revolving around with the commutator. Sometimes the short circuit will burn itself clear and no harm will be caused, excepting the burning of a hole in the mica. It may, however, continue to arc across and burn a good-sized hole in the bar also.

As *The* EDITOR Sees IT

T ¶ *Program Mention*

THE other day our offices were visited by a New York Projectionist brimming over with splendid ideas to improve the craft. Of course, we pocketed quite a few of these ideas mentally for future articles and editorials. One of them struck us as being particularly apt and just. We hereby call upon theatre managers everywhere to insert in their theatre programs the names of their Projectionists as a member of the house staff. The Projectionist deserves mention in the program along with the manager, the cashier, the chief usher, the press representative, the orchestra leader and the wardrobe mistress. If the house staff is listed in the program to lend the theatre an impression of importance, then certainly the Projectionist who projects a perfect show does much to ingratiate the theatre with its patrons. If the staff is mentioned in the program to show the patrons the sense of responsibility the theatre feels toward them, then the Projectionist should be at the head of the list, because to him every day is entrusted the safety of hundreds of people. The names of Projectionists who have sacrificed themselves to stamp out incipient fire would fill a long Roll of Honor. It is time he was recognized as the theatre's central cog, and we hereby launch and pledge to wage vigorously a campaign until this recognition comes to him. We know that in some of the big houses, along Broadway and in some other cities, the Projectionists are already recognized in theatre programs; but the practice should become universal. Show this editorial to your theatre manager and ask him to comply with a just demand.

W ¶ *A Complaint Department*

WITH this issue we are launching a new department. It is called the Complaint Department. It is an effort to help improve the quality of the prints shipped to theatres from the exchanges. We know that the responsibility for damaged prints is subject to controversy. Perhaps we can be of help in relieving the Projectionist of much of the blame (a good deal of it unjust) that is almost always attached to him when prints are reported damaged. The causes of damaged prints are many, but it has always seemed to the editors of this publication (even before they became editors) that a good deal of it could be traced back to improper handling in the exchange film room. The Hays organization in New York has a Conservation Department which keeps a watchful eye over exchange film rooms. Many Union Locals have committees which try to fix the blame for damaged prints after the damage is reported. George Edwards of Local 306, New York, has done splendid work in that direction, taking the fight right into the exchange offices. In a recent issue we published an example of the work of Local 333, Charleston, S. C., which is already accomplishing much to bring about better conditions in this respect. If you receive bad prints from any exchange in your territory, let our Complaint Department know about it at once. We will immediately get in touch with the exchange, or, better still, we will pass on the information to the home office in New York. We guarantee that you'll quickly note improvement in the quality of

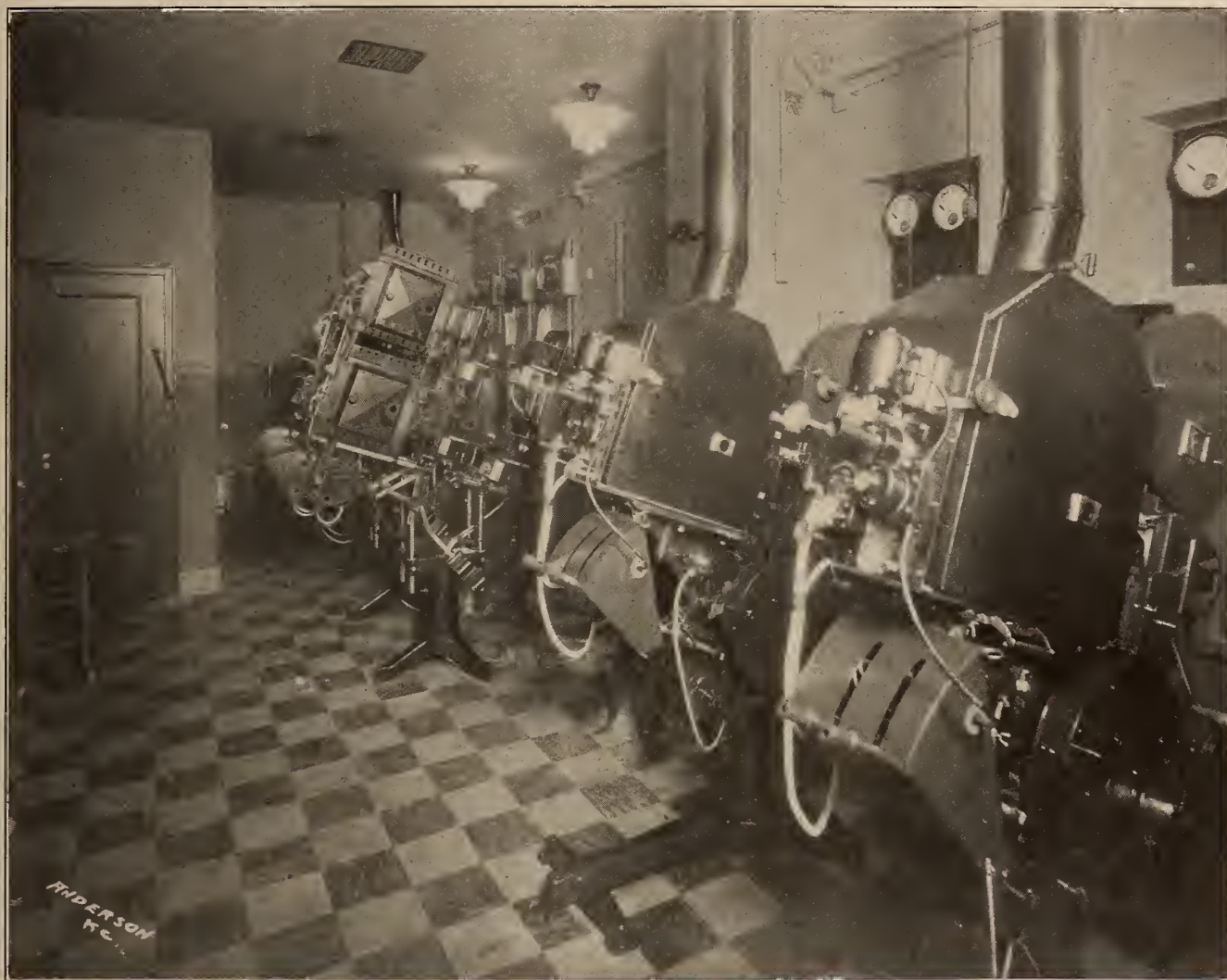
prints from that exchange. A poor print not only occasions unnecessary controversy; it may also prove highly dangerous to you and your patrons. So don't hesitate to write in to the Complaint Department.

A ¶ *A Standing Invitation*

ANOTHER welcome visitor to our offices recently was H. N. ("Doc") Elliott of Local 173, Toronto, who paid us a Christmas call. Upon our suggestion, he immediately accepted Harry Rubin's invitation and visited that noted Projectionist in his quarters in the Paramount Building on Broadway. We understand that "Doc" was gratified—and not a little surprised. Running water, hot and cold. An elevator directly to the booth. A private shower bath. A dressing room. Mr. Rubin laid out the Paramount projection room himself, and a thoroughly modern, comfortable place it is. The room contains the very latest in equipment, and some equipment that is not yet recognized as standard. Mr. Rubin has an inquiring, progressive mind and will try out anything that is at all worthwhile in the hope that he will find something that will tend to make projection a more perfect science than it already is. Many out-of-town Projectionists visit Mr. Rubin yearly, and, although we haven't asked him, we are sure that he will back up this invitation to all Projectionists to visit him when in New York. Now, gentlemen, please don't crowd so.

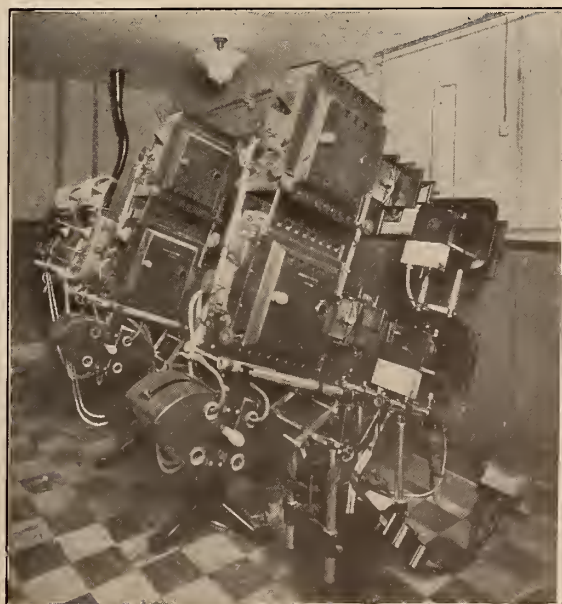
T ¶ *Talking Movies*

TALKING pictures seem to have passed beyond the experimental, fad stage and to have become a permanent fixture of the motion picture industry. Starting with Vitaphone, and a little later, Movietone, there is now an imposing array of talking devices which threaten to invade every picture house in the country. The General Electric Company has a new system (explained in detail in the October issue of THE MOTION PICTURE PROJECTIONIST), which is said to be very efficient. There are a number of cheaper and simpler mechanisms designed for the smaller houses. There is a report current that the General Electric Company, who, with the Radio Corporation of America, has just bought an interest in F.B.O., is already experimenting with radio movies. And so it goes. We are both glad and sorry at this news. We are glad because it is evident that more and more the industry is coming to rely on the expertness of the Projectionist to put the show over successfully. And with this comes, naturally, more money to the craft and an urgent necessity on the part of every Projectionist to become something more than a worker. He must be skilled and brainy to handle all this complicated equipment. But we are a little sorry to see this entrance of a foreign element into the once silent movies. No longer for us the luxuriousness of a comfortable seat in a perfectly quiet theatre, the music playing softly and the players moving across the screen in a dumb but meaningful fashion. After the noise of an office day we used to slip quietly into a movie theatre, shut our eyes, and enjoy a few hours of perfect sleep. Today—ah well, what's the use of complaining?



Projection Room
Loew's Midland Theatre
Kansas City, Mo.

Two views of the Projection Room in Loew's Midland Theatre, Kansas City, Mo. A model room in every respect. Lester Isaac, Supervisor of Projection for Loew Theatres, personally supervised the layout of this room as well as the installation of all equipment therein.



Food for Thought

The following article written by a theater owner recently appeared in his program:

"THE word Union Operator may not mean much to many of our patrons on first thought, yet it means a great deal, leaving out the fact that it means better working conditions for the worker. It does mean this to you, the patrons of theaters. All motion picture films are highly inflammable and a Union Operator in the Projection Room means one who is thoroughly competent, who has served an apprenticeship, and who knows just what to do in all emergencies; you are protected from fire coming from the Projection Room by having a man who has been trained not only to run a motion picture machine, but in fire and panic prevention as well. When you see that red emblem on any screen you may know that the management is doing everything within their power to give you not only the best pictures possible, but also is using every precaution to prevent fires so common in motion picture theaters."

Which appeared in the following commentary by Tommy West of the Labor Herald:

FOR SAFETY IN THEATERS

A Society for the Education and Advancement of the Moving Picture Operators.

The many intricacies in connection with the presentation of the motion picture require the services of skilled artisans, men of integrity and responsibility, particularly so considering the various other mechanical, optical and electrical elements necessary as a part of the projection equipment.

The Kansas City Moving Picture Machine Operators' Union, Local 170, are keeping pace with industry, and as an indication of such, all members are affiliated with the Kansas City Projectionists' Educational Society, a corporation organized for the specific purpose of education and advancement of the craft, the prevention of fires and emergency measures necessary for the protection of the public from disastrous panics. It secures the services of notable speakers and engineers of the craft to address its meetings.

This society is doing much to make Kansas City the home of the finest motion picture presentation in the world. It has made the word "fire" become almost obsolete in projection rooms of this city. For example, of seven fires in the past year, only two small ones occurred in "union operated" theaters, and to make this average even more astounding, of one hundred and thirty operators employed in Kansas City, one hundred and nineteen of them are union operators.

Therefore, it goes without saying when you see the red emblem of the Operators' Union displayed on the screen of your favorite theater it spells S-A-F-E-T-Y.

Below are the theaters that employ members of our organization:

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|---------|-------|--------|----------|---------|---------|-------------|----------|---------|---------|--------|----------|---------|--------|---------------|--------|--------|---------|---------|---------|----------------|---------|-------------|-------|---------|--------|----------|---------|--------|---------|------------|-------------------|----------|-------|---------|----------|-------------|----------|--------|------|---------|-------|------------------|---------------------|---------------|----------|--------|--------|-----|--------|----------------|-------|------|---------|----------|
| Admiral | Aladdin | Alamo | Apollo | Beaumont | Belmont | Bentley | Bonaventure | Broadway | Capitol | Central | Circus | Colonial | Diamond | Empire | Fourth Street | Gaiety | Gilham | Liberty | Lincoln | Linwood | Loew's Midland | Madison | Main Street | Maple | Maywood | Murray | National | Neptune | Newman | Newport | New Palace | North Kansas City | Oak Park | Ocean | Orpheum | Pantages | Penn Valley | Prospect | Regent | Ritz | Riviera | Royal | Shubert—all road | Shubert—attractions | South Trestle | St. John | Strand | Summit | Sun | Ti-oll | Twelfth Street | Vista | Wald | Warwick | Westport |
|---------|---------|-------|--------|----------|---------|---------|-------------|----------|---------|---------|--------|----------|---------|--------|---------------|--------|--------|---------|---------|---------|----------------|---------|-------------|-------|---------|--------|----------|---------|--------|---------|------------|-------------------|----------|-------|---------|----------|-------------|----------|--------|------|---------|-------|------------------|---------------------|---------------|----------|--------|--------|-----|--------|----------------|-------|------|---------|----------|

Kansas City Moving Picture Machine Operators
Local One Seventy

THE KANSAS CITY STAR
Sunday, November 13, 1927

SAFETY FIRST!
The Emblem ASSURES
On the Screen
IT!
THE KANSAS CITY STAR
Morning and Evening, November 14

The Combined Average experience of Union Moving Picture Machine Operators of the Kansas City Organization is 31 years and 2 months.
THE KANSAS CITY STAR
Morning and Evening, November 15

THIS EMBLEM ON THE SCREEN OF MOTION PICTURE THEATERS
SAFETY
THE KANSAS CITY STAR
Morning and Evening, November 17

Experience plus Knowledge equals Competency. Competency plus Care equals Safety.
UNION OPERATOR
Means Safety



THE KANSAS CITY STAR
Morning and Evening, November 25

A THEATER in Your Neighborhood Displays This Emblem
UNION OPERATOR



THE KANSAS CITY STAR
Morning and Evening, November 26

WE are presenting herewith reproductions of a number of advertisements which appeared as part of our publicity campaign in the morning and evening editions of The Kansas City Star.

This is the first time, to our knowledge, in the history of labor organization that advertising of this character has been presented the public. In fact, the use of the official union emblem gives this advertising a totally unique aspect. Particularly is this true when it is considered the advertisements appeared in a great metropolitan newspaper with nearly half a million daily circulation.

The advertising enjoyed maximum effectiveness inasmuch as The Kansas City Star has a carrier delivered circulation which covers Kansas City TWICE daily with nearly one hundred per cent thoroughness.

The advertising represented here appeared in nearly six million separate copies of The Kansas City Star, placing the official union emblem twenty-three times in practically every home in Greater Kansas City and in one hundred thousand homes in surrounding territory.

KANSAS CITY Moving Picture Machine OPERATORS Local One Seventy

MOTION PICTURES
ANY TIME—ANY PLACE
W. S. CROFT
Business Representative
P. O. Box 2, W. A. 1111
THE KANSAS CITY STAR
Morning and Evening, November 19

"When you see that red emblem on any screen you may know that the management is doing everything within their power to give you not only the best pictures possible, but also is using every precaution to prevent fires so common in motion picture theaters."
THE KANSAS CITY STAR
Morning and Evening, November 21

Competent drivers have no accidents—careful operators have no fires.
UNION OPERATORS ARE COMPETENT
THE KANSAS CITY STAR
Morning and Evening, November 22

Then and Now

FIFTEEN years ago an investment of \$150 completely equipped a motion picture "booth." Today the newest theater in Kansas City has equipment in the projection room representing an investment of \$14,000, and with these modern innovations and improvements far greater skill and technical knowledge are required of the operator than ever before.

Fifteen years ago film fires in booths were frequent and disastrous. Today they rarely if ever occur.

Constant application to the study of the various mechanical, optical and electrical elements peculiar to motion picture operation—and especially to the prevention of film fires—has resulted in greatly increased efficiency and safety on the part of the operators.

UNION OPERATORS ARE COMPETENT

Below are the theaters that employ members of our organization:

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|---------|-------|--------|----------|---------|---------|-------------|----------|---------|---------|--------|----------|---------|--------|---------------|--------|--------|---------|---------|---------|----------------|---------|-------------|-------|---------|--------|----------|---------|--------|---------|-------------------|----------|-------|---------|----------|-------------|----------|--------|------|---------|-------|------------------|---------------------|---------------|----------|--------|--------|-----|--------|----------------|-------|------|---------|----------|
| Admiral | Aladdin | Alamo | Apollo | Beaumont | Belmont | Bentley | Bonaventure | Broadway | Capitol | Central | Circus | Colonial | Diamond | Empire | Fourth Street | Gaiety | Gilham | Liberty | Lincoln | Linwood | Loew's Midland | Madison | Main Street | Maple | Maywood | Murray | National | Neptune | Newman | Newport | North Kansas City | Oak Park | Ocean | Orpheum | Pantages | Penn Valley | Prospect | Regent | Ritz | Riviera | Royal | Shubert—all road | Shubert—attractions | South Trestle | St. John | Strand | Summit | Sun | Ti-oll | Twelfth Street | Vista | Wald | Warwick | Westport |
|---------|---------|-------|--------|----------|---------|---------|-------------|----------|---------|---------|--------|----------|---------|--------|---------------|--------|--------|---------|---------|---------|----------------|---------|-------------|-------|---------|--------|----------|---------|--------|---------|-------------------|----------|-------|---------|----------|-------------|----------|--------|------|---------|-------|------------------|---------------------|---------------|----------|--------|--------|-----|--------|----------------|-------|------|---------|----------|

Kansas City Moving Picture Machine Operators
Local One Seventy

THE KANSAS CITY STAR
Sunday, November 27, 1927

Facts and Figures of Interest to All!

THE man in our union with the longest experience in operating projection machines has served 31 years. The experienced member has served five and one-half years. The average of all members is 31 years and 2 months. UNION Operators have experience.

Skill and Care Assure Safety

The base of motion picture film is gun-cotton. It is not explosive, but it is highly inflammable. Care

is required to prevent the heat, generated by a light of many thousand candle-power, from igniting it. Union Operators are careful.

When you are seated comfortably in your favorite play house, remember when you see on the screen THIS MACHINE IS OPERATED BY A UNION OPERATOR that it means there is in that operator a man who has a union card and is a bring-wag-it-around convey—

UNION OPERATOR MEANS SAFETY

THE KANSAS CITY STAR
Sunday, November 20, 1927

Motion picture film is highly inflammable. Competency prevents fires.
UNION OPERATORS ARE COMPETENT

THE KANSAS CITY STAR
Morning and Evening, November 24

MOTION PICTURES PROPERLY PRESENTED IN THEATERS THAT DISPLAY THIS EMBLEM ON THE SCREEN

THE KANSAS CITY STAR
Morning and Evening, November 23

Selling the PROJECTIONIST

To the Public

Kansas City Local Advertises Itself To Public of Half Million

ON the page opposite appears a reproduction of an advertising campaign conducted recently by Kansas City Local 170.

Being, as is stated in the advertisement, the first time in the history of organized labor that advertising of this character and on such a scale has been presented the public, and in addition to the use therein of the Union Label, with its attendant splendid publicity for Unionism, the campaign is an illuminating example of the progressiveness of Local 170—a point which ranks in importance second to none.

The description of the campaign—its purpose is obvious—is very interesting, both as to the text matter of the copy as well as to the manner of its presentation. The advertising copy, in which the keynote is “competency insuring safety,” is forceful, interesting, and to the point, and it enjoyed good make-up. The long experience and the skill of the members of Local 170 is stressed, with the words “safety” and “competency” being dovetailed neatly one into the other. The employment of the “safety” element in the copy undoubtedly succeeded in attracting the attention usually accorded “scare copy,” of which this campaign copy is a good example.

Using display space in the *Kansas City Star*, the campaign was launched on Sunday, November 13th, and, with the exception of the 16th and 18th, on which days no advertising was run, was continued daily through Sunday, November 27th, a period of 13 days. The advertising appeared in both morning and evening editions of the *Kansas City Star*, represented as having a daily circulation of nearly 500,000. On the third Sundays occurring during this period there was only one edition of the newspaper, but an enlarged display space used on these days commanded greater attention.

Calculations tend to show that the advertising appeared in nearly 6,000,000 separate copies of the *Star*, thus placing Local 170's message and the Union Label 23 times in practically every home in Kansas City and

AN EXHIBITOR'S TRIBUTE

“The word Union Operator may not mean much to many of our patrons on first thought, yet it means a great deal, leaving out the fact that it means better working conditions for the worker. It does mean this to you, the patrons of theatres. All motion picture films are highly inflammable and a Union Operator in the Projection Room means one who is thoroughly competent, who has served an apprenticeship, and who knows just what to do in all emergencies; you are protected from fire coming from the Projection Room by having a man who has been trained not only to run a motion picture machine, but in fire and panic prevention as well. When you see that red emblem on any screen you may know that the management is doing everything within their power to give you not only the best pictures possible, but also is using every precaution to prevent fires so common in motion picture theatres.”

(From a Kansas City Theatre Program)

in 100,000 homes in the surrounding territory. The *Star* is reputed to attain nearly complete coverage of the Kansas City area, thus the foregoing estimation is probably not at all extravagant. But assuming that the estimate is a trifle high, it is safe to assume that the coverage was, if not complete, at least nearly so.

Thus, the populace of Kansas City and vicinity had forcibly brought to their attention the desirability of a union projectionist in the theatre; the Union Label was accorded publicity, the result of which will be to the advantage of every union worker in the area, no matter what his trade may be, and, last but by no means least, the people must have been left with an awareness of the progressiveness of Local 170.

The Kansas City campaign evidences careful planning and commendable foresight on the part of Local 170, and its members are deserving of commendation for the splendid manner in which it was put over. Not only in work of this nature but in all other Local activities Local 170 has in this job given all organized labor a fine example of progressiveness and has set a mark to shoot at.

Editor's Note: We consider the work of the Kansas City Local in advertising itself to the public as the most significant effort leading to the betterment of the Craft that has come to our notice. We shall be glad to hear from other Locals about similar efforts and will publish any information in following issues.

The READERS *Have a* WORD *to* Say

A Gold Mine of Information

T EDITOR,
MOTION PICTURE
PROJECTIONIST:
THE MOTION PICTURE

PROJECTIONIST fills a long felt want. It promises to be a gold mine of information for the modern projectionist, and thousands of projectionists will appreciate having a national magazine of their own. Too little space is given the projectionist in our other trade publications devoted to motion pictures. I sincerely trust that brother projectionists will cooperate to make it the success that it rightly deserves.

Manufacturers and dealers will also welcome this publication as an A1 advertising medium because it usually is the projectionists who have the final say in the final purchase of any product they must work with.

It is now up to the projectionist to contribute interesting articles and news notes, and help make this one of the most interesting and best projectionist's magazines in the field. Let's go!—WESLEY TROUT, Fort Worth, Texas.

All Members Subscribe

A EDITOR,
MOTION PICTURE PRO-
JECTIONIST:

Our regular meeting this morning I was successful in having all our members subscribe to THE MOTION PICTURE PROJECTIONIST. Your second issue was even better than the first and I am glad to have had the privilege of bringing it to the attention of our members.—F. BROADBENT, Secretary Local 360, Edmonton, Alberta, Canada.

Best Magazine Published

E EDITOR,
MOTION PICTURE PRO-
JECTIONIST:

ENCLOSED herewith please find five subscriptions for THE MOTION PICTURE PROJECTIONIST. This is all the members we have in town at the present time, or I would be able to send more. I have the October and November issues, and think the PROJECTIONIST the best magazine that has been published for the craft.—BERLIN PARKS, Sec., Treas., Local 387, Lawton, Oklahoma.

A Wonderful Publication

I EDITOR,
MOTION PICTURE PRO-
JECTIONIST:

WISH to congratulate you on the splendid articles by Lester Isaac appearing in your publication. It has been my pleasure to read the copies already issued, and I am very favorably impressed with its suitability for the projectionist. Without doubt THE MOTION PICTURE PROJECTIONIST should have its place alongside the handbooks on projection, because of the valuable information it renders on the most modern equipment and the helpful suggestions as well as the entertainment matter that it renders. Max Hollander's "Recollections of an Old-Timer" is extremely realistic; it is amazing to compare past conditions with the present. It is a pleasure to congratulate the editors on their fine work, and I trust they realize to what extent projection and projectionists will benefit by this wonderful publication.—I. W. SIMONS, Capitol Heights, Md.

Can't Afford to Miss It

I EDITOR,
MOTION PICTURE PRO-
JECTIONIST:

HAVE received the November issue of the magazine and have read it over. Will say that if all succeeding issues are as good we will have a publication that no projectionist can afford to miss. Enclosed please find three more subscriptions from this Local.—E. G. BARNETT, Secretary, Local 631, Orlando, Fla.

Needed This Paper Badly

E EDITOR,
MOTION PICTURE PRO-
JECTIONIST:

ENCLOSED please find a few subscriptions for THE MOTION PICTURE PROJECTIONIST, with money order to cover same. To merely say that I am proud of our new publication would be putting it entirely too mild, because it is a thing we projectionists have long needed and needed badly. It is, I believe, a medium where we shall get the unbiased truth, and it is of course a great pleasure to know that it is strictly in accord with our Union principles. I wish to go on record as saying that we, Local 491, the projectionists of us especially, are highly pleased with our first copy and that if the succeeding issues are even as good as the first we know that we have a real paper for all time. We only wish that we had a membership of 500, so we could send in as many subscriptions. The very best of luck.—O. W. McINTOSH, Secretary, Local 491, Parsons, Kans.

Best Paper I've Seen

E EDITOR,
MOTION PICTURE PRO-
JECTIONIST:

ENCLOSED you will find a money order for several subscriptions. Have received your first two copies and wish to say that your magazine is the best craft publication I have ever seen.—R. BLAKNEY, Secretary, Local 193, Bloomington, Ill.

Nothing But Praise for Paper

A EDITOR,
MOTION PICTURE PRO-
JECTIONIST:

Our meeting last night I secured ten subscriptions from the projectionists that were present, and I am enclosing money-order for the amount. All the boys who have seen a copy of your paper have had nothing but high praise for it. Personally, the first copy was interesting and profitable to me, but the second issue was 100 per cent better, and if the succeeding issues are as good the paper will be worth twice as much as you are asking for it to the boys in our profession. Very best wishes.—J. H. SCHOEMAKER, Secretary, Local 204, Little Rock, Ark.

Needed It For Years

A EDITOR,
MOTION PICTURE PRO-
JECTIONIST:

Enclosing my check for \$1.50 for which please enter my subscription. I have seen the first issue and wish to say that it is very good and the very thing we have needed for years. Keep up the good work.—G. S. HEATWOLE, Staunton, Va.

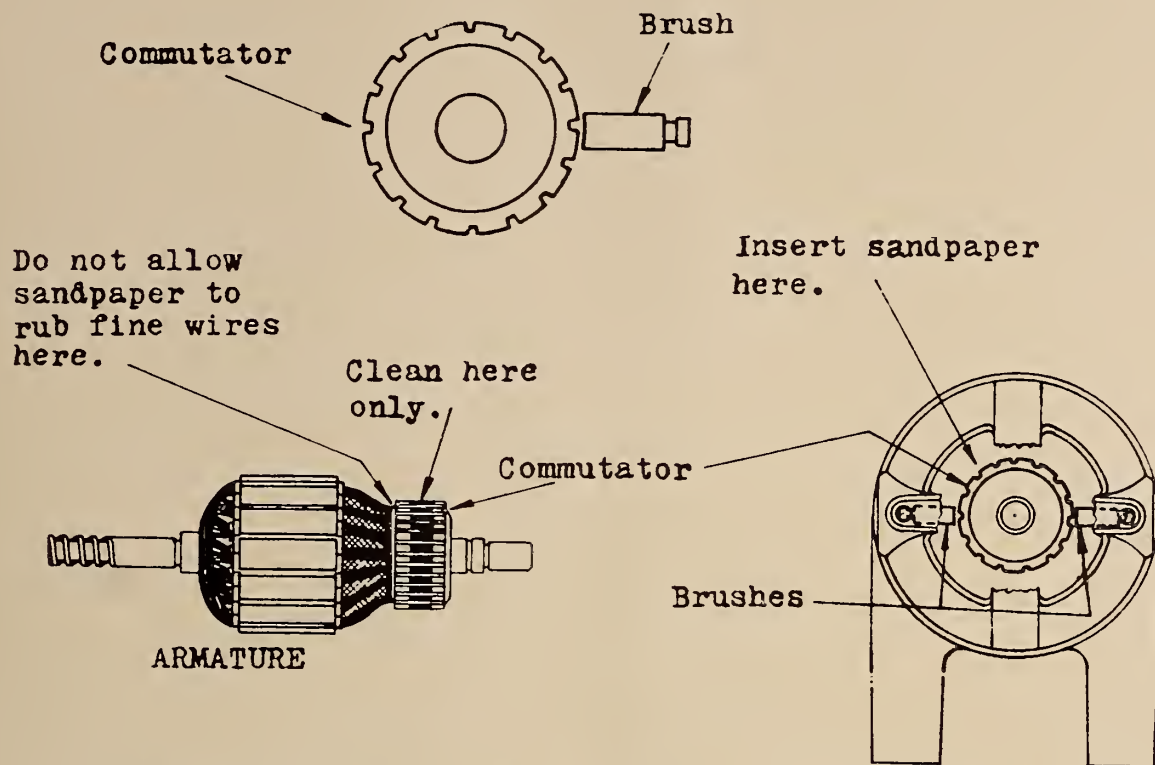


Diagram showing the proper method of cleaning a commutator. Observance of the precautions suggested by Mr. Trout will tend to effect better results, without damaging the motor.

CLEANING COMMUTATORS

By Wesley Trout

Sometimes the commutator will become blackened and dirty, on motors and generators, and a good cleaning is imperative. This is done with a piece of sandpaper of about 8-0 grade (never use emery). Use a piece of wood or other non-conducting material to hold the sandpaper (note cut) on the face of the commutator while it revolves. Be very careful that the sandpaper does not go in further than the inner edge of the commutator, else it may cut some fine wires and ruin the motor.

CARBON BRUSHES

A dirty commutator may cause the motor to balk at starting, or to suddenly stop after it has been running a while (small motors that use brushes and commutator); on generators a dirty commutator will cause sparking and kindred troubles. Often this trouble is

laid to the brushes, but more harm than good is done by molesting the brushes when all that is necessary is to thoroughly clean the commutator.

Ordinarily the carbon brushes need no attention over a period of from six to nine months, but when they are worn down to about $\frac{1}{8}$ " (small motors) in length, they should be replaced.

When replacing the brushes be careful to see that they are put in so the concaved end of the brush fits correctly on the curvature of the commutator (see cut), otherwise the motor will not run properly. The brushes are curved exactly the same as the commutator. Many times trouble is inaccurately attributed to the carbon brushes, and in experimenting with them matters are made worse. A dirty commutator rather than faulty brushes is likely to cause sudden stopping of a motor.

Has Development of Projection Lenses Stopped?

(Continued from page 11)

ture of the illuminating system only under the condition that the source be large enough to fill the dotted cone extending to the left from the condenser to the point P, which is the image formed by the condenser of the point P'. The illustration shows the source just large enough to meet this condition.

If the light source were smaller than shown in this sketch, it would be impossible for the condenser to appear filled with light when viewed from the Point P'. This follows from the fact that no ray of light leaving any point of the light source other than the extreme margin can pass through the margin of the condenser and also through P'. The figure also shows that the angular aperture of the objective is larger than that of the illuminating system, since the dotted lines do not reach to the margin of the lens. No light, therefore, reaches the marginal zone, and the excess diameter is useless insofar as the center of the field, at least, is concerned.

For the same light source the angular aperture of the illuminating system can be increased or decreased by altering any one of several dimensions of the system, but consideration of these points would lead us into a field too remote from the subject of this article to justify it.

After meeting to the best possible advantage all the conditions which must be imposed on an illuminating system for motion picture projection, the ordinary condenser type has an angular aperture of about 20 degrees when adjusted to best advantage for a projection lens of 6-inch focal length. The reflector arc has a higher angular aperture. The most popular type reaches a value of 27 degrees.

Now, it has been frequently observed that some projection lenses which present a very satisfactory image with condenser illumination do not perform so well when used with a reflector arc. This is certainly possible if the angular aperture of the objective is larger than that of the condenser illuminating system. Under this condition, less than the full aperture of the objective is used for the imagery of any given point of film when condensers are used, whereas more of the aperture or full aperture would be used when the change was made to the reflector arc.

Because of the spherical zones in the projection lens, which are always present to a greater or less degree, or because of deliberate over-correction of spherical aberration, the lens might fail to give satisfactory projection with a reflector arc, even though its performance with condensers was entirely satisfactory. It would be more or less accidental if a lens designed for condenser illumination happened to be at the same time adjusted to the best condition for reflector arcs. If reflector arcs are to be used with their full efficiency, they require projection lenses which are designed to give the best possible image with very high relative apertures.

In spite of all its merits, the Petzval lens cannot be absolutely corrected simultaneously for astigmatism and flatness of field even for the small angular fields of view involved in the average motion picture projection. The margin of the field is, therefore, never as well defined as the center. This defect escapes the notice of the average theatre patron *because the action is generally concentrated within the central two-thirds or less of the picture area, and the material which fills up the margin does little more than constitute a frame for the interesting part of the picture.*

It is natural to inquire, however, why an anastigmat

construction such as is used in photography would not offer better projection. The answer is that, while the anastigmat produces well-defined pictures of much greater angular extent than is required of a projection lens, it does it only at relative apertures which are less than those required in projection objectives. If an anastigmat be increased in diameter to give the relative apertures required of motion picture objectives, the increase in spherical zones becomes so great that there is very perceptible deterioration of definition in the very center of the picture. The Petzval construction is characterized by small spherical zones, and for this reason has been the favorite lens for the projection of motion pictures since the beginning of the art.

There has developed recently, however, a desire to reduce the projection distance below the previous average value without correspondingly decreasing the size of the projected picture. This will lead either to pictures whose margins are very poorly defined or else to the adoption of an anastigmat lens. If the latter expedient be resorted to, either the relative aperture of the lens must be decreased or less sharp definition be accepted over the whole area of the picture than is now expected.

If the relative aperture be reduced in the interest of definition, then illumination must suffer unless light sources of very high intensity become available. Another difficulty may be presented in the increased difficulty of getting an appearance of even illumination because of the greater angle of incidence on the screen of the pencils of light forming the marginal image. It is very doubtful whether the advantages which follow from the use of the very short projection distance are not overbalanced by the disadvantages in the quality of the projected picture.

In the early part of this article it was promised that reference would be made later to some recent lenses which differ from the Petzval type. Two patents have been issued which describe lenses very similar to each other, one of which claims decreased cost of production, and the other increased illumination. These lenses, both of which are on the market, differ from the Petzval construction in that the back component is relatively close to the film gate. It may be argued, however, that the difference in construction between these lenses and the Petzval is more apparent than real.

Referring again to Fig. 1, the front component is seen to resemble very much a telescope objective. As a photographic or projection objective, a telescope objective would be unsatisfactory because of its very limited field of sharp definition and because of its insufficient relative aperture. By adding to the telescope objective a second component, however, the combined focal length can be very much decreased, thereby gaining the necessary speed, and, further, by a suitable choice of shapes and glasses of the lenses of the rear component and its distance from the front lens, the useful field of view can be extended.

From the standpoint of performance, nothing is claimed for the one; while for the other it is claimed that it leads to a brighter image. This can be true, however, only if it can be shown that the construction makes it possible to produce lenses of higher relative aperture than other types, and that the angular aperture of the illuminating system is large enough to make use of the enlarged aperture of the projection lens. Otherwise, the mere fact of making the back focus short or, in other words, of bringing one of the components close to the film gate, cannot have any effect on the brightness of the image.

What Projectionists Are Doing

Local 171—Pittsburgh, Pa.

For a number of years a small group of members of Local 171 had cherished the hope that some day the members of the organization would adopt some means for caring for the widows and orphans of deceased members other than by the usual donation method. This dream became a reality at the last regular meeting when the Relief Committee of Local 171, in the name of the Union, presented each member with a \$500 life insurance policy. This action on the part of the Relief Committee was a great and pleasant surprise to the majority of the members, who were unaware of the plans of the Committee.

It really means something when the members of a Labor Union can realize that the Union is looking ahead into the future and planning for the welfare of their families, as well as guarding their present interests.

* * *

Officers for the years 1928-29 were elected at the last meeting of Local 171. Many of the present officers were honored with reelection. The officers elected are as follows: President, James A. Sipe; Vice-President, J. W. Shawkey; Treasurer, C. N. Haviland; Secretary, A. L. Criswell, and Business Representative, Arthur G. Williams.

* * *

The Executive Board is now composed of J. P. Oyer, John Indo, Louis Indo, J. R. McKelvey and R. C. Freeman. The Board of Trustees consists of W. B. Benno, P. L. Ferry and J. A. Rhodes. Applicants for membership will be examined by William T. Crane, Joseph Bruno, and Joseph Lydzinski.

The strenuous campaign waged by the candidates added a spice of interest to the election, but in the majority of instances the good fellowship and friendliness of the rivals remained uppermost. Now that the election is over, the affairs



Alfred L. Criswell

of the Local will resume their normal stride.

Another grave danger has been added to the already perilous hazards that confront the projectionist, according to headlines in the Pittsburgh Post-Gazette which read: "Romance Fires Film at Aldine."

Projectionists in Pennsylvania are warned to take added precautions when projecting "The Understanding Heart," the warmth of which inspired the above headline.

* * *

The Pittsburgh Chapter of the American Projection Society also had the election bee in its bonnet, and selected the following men to guide its destinies throughout the coming year: Charles Appel, President; William Crane, Secretary; Milton Bailie, Treasurer; Angelo Diodati, Sergeant-at-Arms, and Louis Indo as a member of the board of Governors.

Keeper - of - the - Sheckels Bailie treated the members to a duck feast, at which all were happy except, of course, the duck. The organization is still continuing its progressive movements, and under the leadership of President Appel will undoubtedly make greater strides forward.

* * *

Banquets seem to be the order of the day, and it has been the good fortune of the writer to participate in two recently. One, at the aforementioned demise of the duck, and the second at the festive board of Jimmie Oyer, who entertained the members of the retiring and incoming Executive Board of the Union. Chile-con-carne was the piece de resistance at the latter affair, and Mrs. Jimmie Swept all before her in the election of Culinary Champion.

Everyone present enjoyed themselves immensely, and the remarkable gastronomic abilities of Clayton A. Dietrich suffered opposition only from Louis Indo, who was, however, unable to overcome the Senator's early lead.

* * *

The Stanley-Davis-Clark Company's Grand Theatre recently inaugurated the policy of Sunday midnight performances with a showing of "Underworld," and the resultant attendance far exceeded the fondest expectations of Manager James Palmer.

The laws of Pennsylvania prohibit Sunday performances, and the first ticket was placed on sale at 12.05 A. M., and within the short space of thirty minutes over 3,000 admissions were sold—and this on a rainy night.

It was found necessary to call upon the police to untangle the traffic jam. A touch of comedy was injected into the proceedings when someone removed a badge from one of Pittsburgh's "finest" and deposited it in the theatre where it was found later.

Because of the reception accorded this first of the midnight performances it is thought that they will become a regular feature, and possibly the idea may spread to the smaller theatres. It may be that this action will speed the departure of the Blue Laws from Pennsylvania.

And, as Pepys would say, so to bed.

A. L. CRISWELL.

Local 173—Toronto, Can.

The annual election of officers of Local 173 was held on the second Sunday in December, as is customary. The pre-election period was marked by fine campaigning by all the candidates for office, with the result that election day witnessed spirited balloting, punctuated by sharp discussions of the merits of the respective candidates.

When the polls closed, a count of the ballots disclosed the following results: Charles Dentebeck had been reelected President for the eighth consecutive time; H. N. "Doc" Elliott was elected Vice-President; George Jones was reelected Secretary-treasurer, and the one and only Business Agent, William P. Covert, was reelected as usual. He has been in office since 1911.

The new Executive Board is composed of Sam Wells, Art Milligan, Bill Ayers and Harry Dobson. Local 173 will be represented at the International Convention by President Dentebeck and Harry Dobson.

Local 173 looks forward to the coming year with high hopes of continued progress and prosperity.

H. N. ELLIOTT.

Local 306—New York City

In one of the heaviest votes on record, the annual election of officers of Local 306 was held on Wednesday, December 28th, at Beethoven Hall. The polls were open from 8 A. M. to 6 P. M., and the Hall was the gathering place of projectionists from all the Metropolitan area from early morning until well into the evening.



Simon Terr

With a single exception—that being a replacement on the New York Executive Board—the entire ticket headed by Sam Kaplan, who has directed the destinies of Local 306 during the past year, was retained in office by an overwhelming vote. By vote of the Local membership, the length of office of the Local officers has been extended to two years, instead of one year, as was formerly the case.

The official family of Local 306 for the coming two years follows: President, Sam Kaplan; Vice-President, Charles Eichhorn; Secretary, Frank R. Day; Financial Secretary, Dave Engel; Treasurer, Max Fineberg; Business Agent (Boroughs of Richmond, Manhattan and Bronx), Simon Terr; Business Agent (Boroughs of Kings and Queens), James Lefante.

On the Board of Trustees will be B. A. Friedman, Morris Pall and Morris Sternberg. The New York Executive Board will be comprised of T. Greenberg, A. Roncoti, M. J. Rotker, E. J. Stewart, H. Weinberger, and Jack Wolheim, the latter being the sole newly elected officer. On the Brooklyn Executive Board will be Fred Castle, I. Feldman, H. Luck, and H. Paxton.

With the membership roll of the Local approximating 1,200, including those who are on the road, the total number of votes cast was 1,047, conclusive proof of the splendid interest of the membership in the affairs of their Local. Further testimony to the esteem in which President Sam Kaplan and his official family are regarded by the membership is evidenced by the fact that the Kaplan ticket received approximately five-sixths of the total vote cast.

Plans for the further advancement of the schedule of progress

mapped out and maintained by the officers of the Local during the past year are rapidly being laid, and there is every reason to believe that Local 306 will experience a period of prosperity and advancement unparalleled in its history.

* * *

Arrangements are now being made for the big Victory Ball which will be tendered President Sam Kaplan and his brother officers on January 28th at the Hotel Astor. Present indications, based on the report of the Arrangement Committee and the large advance order of reservations for the affair, are that the Victory Ball will be a gala event, considered from every viewpoint.

* * *

During the month of December the Manhattan Projection Society held two meetings, on the 12th and the 24th. The meeting of the 12th was presided over by President Simon Terr, who introduced to the members Harry Rubin, Supervisor of Projection for Publix Theatres, and Harry Sherman, also of Publix Theatres.

Mr. Rubin gave a very interesting talk, in which he urged the members to consider their craft as one of the most important in the theatre, and advocated a continual effort on the part of Projectionists to better themselves in their craft. Mr. Rubin traced the development of the motion picture industry from its early days, comparing the present methods and equipment with that of bygone days, and told his listeners that they might expect just as great an advancement in the forthcoming corresponding period, in anticipation of which they should always be on the alert to better themselves. Mr. Rubin expressed the conviction that Projectionists and projection were to his mind, among the most important cogs in the theatre machine.

Following Mr. Rubin to the speaker's rostrum was Harry Sherman. Mr. Sherman was in very good form, as is usual, and he fully sustained his reputation as one of the craft's most charming and most eloquent speakers.

The meeting closed with an address by President Sam Kaplan, who indorsed the sentiments of the preceding speakers and pledged his every effort to the program of bettering the standard of the Projectionist craft in general and Local 306 in particular.

The second meeting of the So-

ciety, on the 24th, was presided over by Lester Isaac, Supervisor of Projection for Loew Theatres. Mr. Isaac proved himself a very capable chairman, and on the occasion of his passing the gavel over to another, he proved himself an even better speaker. Mr. Isaac's talk was concerned with the many advantages accruing to the craft as a result of the better theatres, better equipment and better shows now existent, and he offered a most interesting comparison of equipment schedules of years ago and of today.

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On Saturday, December 10th, at midnight, Local 306, New York City, held its annual Sick Benefit Show. The affair was held at the Fox Academy of Music, 14th street, which has a seating capacity of 4,000.

The benefit was a huge success. The proceeds netted the Sick Fund nearly \$5,000.

The program was made up of Movietone and Vitaphone subjects, with the big surprise of the evening coming when the Local members suddenly saw projected on the screen a Movietone subject of their officers. Included on the Movietone program was Gertrude Lawrence, Charles "Chick" Sales and a News Reel; on the Vitaphone: Al Jolson in "The Jazz Singer," this feature closing the program.

As early as 11.15 P. M. a crowd was gathered at the theatre entrance, and shortly before midnight the crush was so great that a special detachment of police was needed to keep the throng in order. With the exception of the crowding outside the theatre, everything went along like clockwork.

Local 306 is indebted to Mr. John Zanft of Fox Theatres Corp. for use of the Academy; to the Fox-Case Co. for the Movietone subjects; to the Vitaphone Corp. for the Vitaphone numbers; to Warner Bros. for the use of "The Jazz Singer"; to the boys who so willingly volunteered to work the show, and to the many others for their kind assistance in helping to make the Show the big success it was.

The success of this Benefit Show has led to speculation on the possibility of holding two or more of these benefit shows each year and thus making it possible to do away with assessments. Plans in this direction are as yet only in the speculative stage, but it may become a policy in the future, if other Benefit Shows are successful.

FRANK DAY.

Classified Index of Manufacturers and Dealers

Dealers

ALABAMA

Queen Feature Film Co., 1916½ Morris Ave., Birmingham, Ala.

ARIZONA

Arizona Film Supply Co., 323 Morley Ave., Nogales, Ariz.
Chester L. Dietderich, 100-A Pleasant St., Prescott, Ariz.

ARKANSAS

Butler Theatre Supply Co., Russellville, Ark.
Ensor & Co., 215 W. 3rd St., Little Rock, Ark.
Southern Film & Supply Co., 111½ Main St., Pine Bluff, Ark.

CANADA

Cameron Bros. Theatre Sup. Co., Regina, Can.
Canadian Theatre Supply Co., 22 Dundas St., West Toronto, Can.
Canadian Theatre Supply Co., Winnipeg, Can.
Coleman Elec. Co., 258 Victoria St., Toronto, Can.
Electrics, Ltd., Montreal, Quebec, Can.
Perkins Elec. Co., 21 Wilton Sq., Toronto, Ont.
Perkins Electric Co., 2027 Bleury St., Montreal, Can.
Perkins Electric Co., 402 Film Exchange Bldg., Winnipeg, Can.
Perkins Electric Co., Ltd., Wilton Square, Toronto, Can.
Aaron Stevens, 224 Eighth Ave., Calgary, Can.
Theatre Equipment Supply Co., 553 Granville St., Vancouver, Can.
United Electric Co., Ltd., 118 Granville St., Vancouver, B. C., Can.
Wells Bros. Amusement Co., Sylvan Ave., Toronto, Can.

CALIFORNIA

Bell & Slimson, 433½ E. 3rd St., Los Angeles, Cal.
Breck Photoplay Supply Co., 2028 S. Vermont Ave., Los Angeles, Cal.
Breck Photoplay Sup. Co., 98 Golden Gate Ave., San Francisco, Cal.
California M. P. Equip. Co., 836 S. Olive St., Los Angeles, Cal.
Davis Bros., 187 Golden Gate Ave., San Francisco, Cal.
Al. Du Bus, 1072 Wilton Pl., Los Angeles, Cal.
Electrical Products Co., 1128 W. 16th St., Los Angeles, Cal.
G. Gennert, 917 Maple Ave., Los Angeles, Cal.
Ed H. Kemp, 309 Turk St., San Francisco, Cal.
Los Angeles Motion Picture Co., 215 E. Washington St., Los Angeles, Cal.
Herbert S. Mace, Redlands, Cal.
Miles Bros. of California, 1149 Mission St., San Francisco, Cal.
National Theatre Supply Co., 1910 So. Vermont St., Los Angeles, Cal.
National Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.
National Theatre Supply Co., 147 Leavenworth St., San Francisco, Cal.
Walter G. Preddy, 187 Golden Gate Ave., San Francisco, Cal.
S. L. Russel, Film Exchange Bldg., Los Angeles, Cal.
J. Slipper & Co., 838 S. Olive St., Los Angeles, Cal.
Southern Electrical Supply Co., 3rd and East Sts., San Diego, Cal.
Theatre Ltg. & Equip. Co., 253 Golden Gate Ave., San Francisco, Cal.
Theatre Equipment Supply Co., 146 Leavenworth St., San Francisco, Cal.
Theatre Supply Co., 1956 Vermont St., Los Angeles, Cal.
Western Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.

CENTRAL AMERICA

J. Carter Searcy, Guatemala City, Guatemala.

COLORADO

National Theatre Supply Co., 2106 Broadway, Denver, Colo.

This entire Index is corrected monthly. So far as possible it embraces every product, every manufacturer and every dealer of interest to projectionists. Manufacturers and Dealers are requested to look over this index carefully and report to us at once if their names are missing, wrongly spelled or wrong address listed. Insertions and corrections will be made at once.

CONNECTICUT

Corrigan's Theatre Equip. Co., 50 W. Main St., Waterbury, Conn.
National Theatre Supply Co., 131 Meadow St., New Haven, Conn.
Repass, Harries & Co., 255 Franklin Ave., Hartford, Conn.
Conn. Independent M. S. Co., 131 Meadow St., New Haven, Conn.
Independent M. S. Co., 131 Meadow St., New Haven, Conn.

DELAWARE

Carl B. Rehder, Wilmington, Del.

FLORIDA

Amusement Supply Co., 312½ Twigg St., Tampa, Fla.
Drollinger Theatre Supply Co., 9 S. Lee St., Jacksonville, Fla.
Griffith, G. W., Box 2333, Tampa, Fla.
Tampa Photo & Art Supply Co., 314 Twiggs St., Tampa, Fla.

GEORGIA

Consolidated Film & Supply Co., 111 Walton St., Atlanta, Ga.
National Theatre Supply Co., 102½ Walton St., Atlanta, Ga.
Southern Theatre Equipment Co., 9 Nassau St., Atlanta, Ga.
Eugene Wilde, P. O. Box 102, Atlanta, Ga.

ILLINOIS

Acme M. P. Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Amusement Supply Co., 740 S. Wabash Ave., Chicago, Ill.
Burke & Jones, Chicago, Ill.
Capital Merchandising Co., 536 E. Dearborn St., Chicago, Ill.
Chicago Stg. & Ltg. Co., 112 N. LaSalle St., Chicago, Ill.
Chicago Cinema Equip. Co., 820 So. Tripp Ave., Chicago, Ill.
C. G. Demel, 845 S. State St., Chicago, Ill.
Exhibitors' Supply Co., 825 So. Wabash Ave., Chicago, Ill.
Fulco Schaffer Sales Co., 24 E. 8th St., Chicago, Ill.
E. E. Fulton Ct., 1018 So. Wabash Ave., Chicago, Ill.
Holke Theatre Supply Co., 845 So. State St., Chicago, Ill.
Joseph Hopp, 57 E. Jackson Blvd., Rm. 604, Chicago, Ill.
Illinois Theatre Equip. Co., 12-14 E. 9th St., Chicago, Ill.
Kiefer Elec. Supply Co., Peoria, Ill.
Midwest Ticket & Supply Co., 845 So. Wabash Ave., Chicago, Ill.
Monarch Theatre Supply Co., 724 So. Wabash Ave., Chicago, Ill.
Movie Supply Co., 844 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 825 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 624 So. Michigan Ave., Chicago, Ill.
Roval Theatre & Supply Co., 180 East Ave., Kankakee, Ill.
Joseph Spratler, 12-14 E. 9th St., Chicago, Ill.
Western Motion Pictures Co., 102 W. Main St., Danville, Ill.
Co-operative Amusement & Supply Co., Gaiety Theatre Bldg., Springfield, Ill.

Dealers

INDIANA

Exhibitors Supply Co., 128 W. Ohio St., Indianapolis, Ind.
Fort Wayne Engineering & Supply Co., 6th and No. Harrison Sts., Fort Wayne, Ind.
Fulco Sales Co., 111 So. Capitol Ave., Indianapolis, Ind.
E. E. Fulton Co., 111 So. Capitol Ave., Indianapolis, Ind.
H. Liever Co., 24 W. Washington St., Indianapolis, Ind.
Muncie Film Supply Co., 202½ E. Main St., Muncie, Ind.
National Theatre Supply Co., 128 W. Ohio St., Indianapolis, Ind.

IOWA

Blackmore, W. F., 315 Brady St., Davenport, Iowa.
Dubuque Sales Co., 2734 Jackson St., Dubuque, Iowa.
Eastman Kodak Stores, Inc., 608 Fierce St., Sioux City, Iowa.
Exhibitors' Supply Co., Des Moines, Iowa.
National Theatre Supply Co., 1004 Grand Ave., Des Moines, Iowa.
National Theatre Supply Co., 10th and High Sts., Des Moines, Iowa.
Zimmerman Brothers, Sioux City, Iowa.

KANSAS

Southwest Theatre Equipment Co., Wichita, Kans.

KENTUCKY

American M. P. Co., Alamo Theatre Bldg., Louisville, Ky.
Blake Amusement Co., 435 So. 3rd St., Louisville, Ky.
Scheckler, Arthur V., Tyler Bldg., Louisville, Ky.
Louisville Film & Supply Co., Rex Theatre Bldg., 555 So. 1st St., Louisville, Ky.

LOUISIANA

Consolidated Film & Supply Co., 914 Craver St., New Orleans, La.
Crescent City Film Exchange, 621 Poydras St., New Orleans, La.
Electrical Supply Co., 324 Camp St., New Orleans, La.
Harcol M. P. Industries, 610 Baronne St., New Orleans, La.
National Theatre Supply Co., 610 Saratoga St., New Orleans, La.
Southern Theatre Equipment Co., New Orleans, La.
Southern Theatre Service, 1219 Alvar St., New Orleans, La.
Vivirito, George, 318 Batonna St., New Orleans, La.

MAINE

Pine Tree State Amusement Co., 85 Market St., Portland, Maine.

MARYLAND

Dusman, J. F., 213 No. Calvert St., Baltimore, Md.
Haeefe, N. C., 228 Gay St., Baltimore, Md.
Lewy Studios, 853 No. Eutaw St., Baltimore, Md.
National Theatre Supply Co., 228 Gay St., Baltimore, Md.
Townsend, H. S., 1625 E. 29th St., Baltimore, Md.
Wyatt, E. J., 1605 No. Milton Ave., Baltimore, Md.

MASSACHUSETTS

Eastern Theatre Equip. Corp., 65 Broadway, Boston, Mass.
Exhibitors' Supply Co., 67 Church St., Boston, Mass.
Gately, J. F., 33 Lyman St., Springfield, Mass.
Handy, A. D., Boston, Mass.
Independent Theatre Supply Co., 49 Church St., Boston, Mass.
Marson, R. D., 106 Broadway, Boston, Mass.
National Theatre Supply Co., 69 Church St., Boston, Mass.

Dealers

Rotman, Morris, 26 Browning Ave., Dorchester, Mass.
 United Theatre Equip. Co., 26 Piedmont St., Boston, Mass.
 Wells & Douglas, 1108 Boylston St., Boston, Mass.
 Wetmore, B. C., 2 Park Sq., Boston, Mass.
 Wheaton, L. B., Worcester, Mass.
 Worcester Film Corp., 340 Mason St., Worcester, Mass.

MICHIGAN

Amusement Supply Co., Film Bldg., Detroit, Mich.
 Cinema Ser. Co., 141 Elizabeth St., E., Detroit, Mich.
 Exhibitors' Supply Co., 14 Elizabeth St., Detroit, Mich.
 Feldstein, A. N., 1670 Pasadena Ave., Detroit, Mich.
 Theo. Kundtz & Co., 402 Lincoln Bldg., Detroit, Mich.
 McArthur Equip. Co., 1963 Grand River Ave., Detroit, Mich.
 National Theatre Supply Co., 2105 John R St., Detroit, Mich.
 Service Theatre Supply Co., 137 Elizabeth St., Detroit, Mich.

MINNESOTA

Cunningham, H. B., 964 University Ave., St. Paul, Minn.
 Exhibitors' Supply Co., 612 Producers' Exchange Bldg., Minneapolis, Minn.
 General Distributing Co., 110 Lake Ave., So., Duluth, Minn.
 Huntleys, The, Winona, Minn.
 Lochran Film & Slide Service, 706 Film Exchange Bldg., Minneapolis, Minn.
 National Equipment Co., 409 W. Michigan Ave., Duluth, Minn.
 Northern Theatre Supply Co., 221 Loeb Arcade, Duluth, Minn.
 Rialto Theatre Supply Co., 56 Western Ave., Minneapolis, Minn.
 Rialott Co., The, Minneapolis, Minn.
 Standard Equipment Corp., 39 Western Ave., Minneapolis, Minn.
 Teco Products Mfg. Co., 245 Loeb Arcade, Minneapolis, Minn.
 Twin City Cadium & Supply Co., 706 First Ave., N., Minneapolis, Minn.
 United Theatre Supply Co., 34 Western Ave., Minneapolis, Minn.
 The Western Equip. Exchange, 35 Western Ave., Minneapolis, Minn.

MISSISSIPPI

Southern Theatre Service, P. O. Box 455, Grenada, Miss.

MISSOURI

Cole Theatre Supply Co., 109 W. 18th St., Kansas City, Mo.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Exhibitors' Supply Co., 3316 Lindell St., St. Louis, Mo.
 Fulco-Schaffer Co., 3301 Olive St., St. Louis, Mo.
 Fulton, E. E., & Co., 3403 Olive St., St. Louis, Mo.
 National Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 National Theatre Supply Co., 3315 Olive St., St. Louis, Mo.
 Opera Supply Co., 601 Shubert Bldg., St. Louis, Mo.
 Sanderson Elec. Co., St. Louis, Mo.
 Seweig & Engel Theatre Supplies, St. Louis, Mo.
 Star Film & Supply Co., 413 Edward St., St. Joseph, Mo.
 Stebbins, Charles M., Picture Supply Co., 1822 Wyandotte St., Kansas City, Mo.
 Yale Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 A-A Electric Machinery Co., 1117 Cherry St., Kansas City, Mo.

MONTANA

Western Theatre Equipment Corp., Billings, Mont.

NEBRASKA

Eastman Kodak Stores, Inc., Lincoln, Neb.
 Exhibitors' Supply Co., 1518 Davenport St., Omaha, Neb.
 Lincoln Photo Supply Co., Omaha, Neb.
 National Theatre Supply Co., 1514 Davenport St., Omaha, Neb.
 Sercie Theatre Supply Co., 303 No. 16th St., Omaha, Neb.

Dealers

U. S. Theatre Supply Co., 1506 Davenport St., Omaha, Neb.
 United Theatre Equip. Corp., 323 So. 15th St., Omaha, Neb.
 Western Supply Co., 2581 Kansas Ave., Omaha, Neb.
 Western Theatre Supply Co., 15th and Davenport Sts., Omaha, Neb.

NEW JERSEY

Kaufman, Frank N., 750 Broad St., Newark, N. J.
 Metropolitan Motion Picture Co., 116 Market St., Newark, N. J.

NEW MEXICO

Eastern New Mexico Theatre Supply Co., Box 548, Clovis, N. M.

NEW YORK

J. F. Adams, 459 Washington St., Buffalo, N. Y.
 Acme Exchange, 341 W. 44th St., N. Y. City.
 Amusement Supply Co., 729 Seventh Ave., N. Y. City.
 Auburn Film Co., Auburn, N. Y.
 Auburn Theatrical Supply Co., Auburn, N. Y.
 A. Z. Motion Picture Supply Co., 266 Houston St., N. Y. City.
 A. Z. Motion Picture Supply, 1413 Bedford Ave., Brooklyn, N. Y.
 Becker Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Behrend Motion Picture Supply Co., 729 Seventh Ave., N. Y. City.
 Bender, George, 28 Centre St., N. Y. City.
 Better Service Film Co., 110 Ferris Ave., Syracuse, N. Y.
 Capitol Motion Picture Supply Co., 727 Seventh Ave., N. Y. City.
 Capitol Stg. & Ltg. Co., 626 Tenth Ave., N. Y. City.
 Columbia Stg. Ltg. Co., 709 Columbia Theatre Bldg., N. Y. City.
 Crouse, Hinds Co., Wolf and 7th Sts., Syracuse, N. Y.
 Crown Motion Pic. Supplies, 729 Seventh Ave., N. Y. City.
 Empire Theatre Supply Co., 42 Orange St., Albany, N. Y.
 Empire Theatre Sup. Co., 619 Spring St., Utica, N. Y.
 Fenyvessey, Carol, Rochester, N. Y.
 Gennert, G., 24 E. 13th St., N. Y. City.
 Greenbaum, 436 Cornelius St., Brooklyn, N. Y.
 Herbert & Huesgen, 18 E. 42nd St., N. Y. City.
 Hudson Elec. Equip. Co., 141 W. 44th St., N. Y. City.
 Independent Movie Sup. Co., 42 Orange St., Albany, N. Y.
 Lyon, J. T. & D. B., Schenectady, N. Y.
 Kaplan, Sam, 729 Seventh Ave., N. Y. City.
 Mason, Chas. E., 103 W. Main St., Rochester, N. Y.
 Mestrum, H., 817 Sixth Ave., N. Y. City.
 Modern Elec. Mch. Co., 2927 Third Ave., N. Y. City.
 Motion Picture Apparatus Co., 110 W. 32nd St., N. Y. City.
 Motion Picture Service Co., 417 W. 44th St., N. Y. City.
 National Theatre Supply Co., 1560 Broadway, N. Y. City.
 National Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Perfection Supply Co., 98 Park Pl., N. Y. City.
 S & M Sales Co., 123 Lafayette St., Utica, N. Y.
 Supreme Motion Picture Repair Co., 926 Broadway, Brooklyn, N. Y.
 Syracuse Supply Co., 314 W. Fayette St., Syracuse, N. Y.
 United Proj. & Film Corp., 51 Chapel St., Albany, N. Y.
 United Proj. & Film Corp., 228 Franklin St., Buffalo, N. Y.
 Univ. Elec. Stage Ltg. Co., 321 W. 50th St., N. Y. City.

NORTH DAKOTA

McCarthy Supply Co., 619 N. P. Ave., Fargo, N. D.

NORTH CAROLINA

A. & B. Moving Picture Supply Co., Raleigh, N. C.
 Carolina Theatre Supply Co., United Film Bldg., Charlotte, N. C.
 Ettabran Film Co., Charlotte, N. C.
 Exhibitors' Supply Co., Charlotte, N. C.
 National Theatre Supply Co., 222 W. 4th St., Charlotte, N. C.

Dealers

OHIO

American Theatre Equipment Co., 165½ No. High St., Columbus, Ohio.
 American Theatre Supply Co., 310 St. Clair St., Toledo, Ohio.
 Artfilm Co., Cleveland, Ohio.
 Bodiker, D. A., 128 No. Garfield St., Dayton, Ohio.
 Central F. F. Co., 60 Public Sq., Lima, Ohio.
 Cincinnati Theatre Supply Co., Broadway Film Bldg., Cincinnati, Ohio.
 Cincinnati M. P. Co., 1434 Vine St., Cleveland, Ohio.
 Dayton Theatre Sup. Co., 225 Jefferson St., Dayton, Ohio.
 Doner, Frank M., 2409 Maple Wood Ave., Toledo, Ohio.
 Dwyer Bros. & Co., 520 Broadway, Cincinnati, Ohio.
 Exhibitors' Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Folwer & Salter, Cleveland, Ohio.
 Gill Electric Co., 46 Cypress Ave., Columbus, Ohio.
 Gross & Johnson, 2100 Payne Ave., Cleveland, Ohio.
 Limbocker, George, Springfield, Ohio.
 Motion Picture Equip. Co., 17 Ervin Block, West Canton, Ohio.
 Moving Picture Equip. Co., 208 Market Ave., So., Canton, Ohio.
 Moving Picture Supply Co., 439 Falls Ave., Youngstown, Ohio.
 National Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 National Theatre Supply Co., 520 Broadway, Cincinnati, Ohio.
 O'Connor & Co., A., 9702 Euclid Ave., Cleveland, Ohio.
 Oliver Moving Pic. Sup. Co., Film Exchange Bldg., Cleveland, Ohio.
 Post Glover Elec. Co., Cincinnati, Ohio.
 Price, L. M., Co., 108 W. 4th St., Cincinnati, Ohio.
 Romell Motion Pictures, Inc., 1411 Walnut St., Cincinnati, Ohio.
 Runey, Clarence E., 1434 Vine St., Cincinnati, Ohio.
 Standard Film & Service Co., Cleveland, Ohio.
 Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Tri-State Supply Co., 2112 Payne Ave., Cleveland, Ohio.

OKLAHOMA

Anderson Theatre Supply Co., 116 So. Hudson St., Oklahoma City, Okla.
 National Theatre Supply Co., 308 W. California St., Oklahoma City, Okla.
 United Theatre Equip. Corp., 116 So. Hudson St., Oklahoma City, Okla.
 Yale Theatre Supply Corp., 10 So. Hudson St., Oklahoma City, Okla.
 Southern Theatre Equip. Co., 328 California Ave., Oklahoma City, Okla.
 Shelton, J. M., Oklahoma City, Okla.

OREGON

Bentley, E. E., Hillsboro, Ore.
 Conant, C. F., Portland, Ore.
 National Theatre Supply Co., 60 Glisan St., Portland, Ore.
 National Theatre Supply Co., 393 Oak St., Portland, Ore.
 Portland Moving Picture Mch. Co., Rivoli Theatre Bldg., Portland, Ore.
 Service Film & Supply Co., 393 Oak St., Portland, Ore.

PENNSYLVANIA

Alexander, George H., Diamond St., Pittsburgh, Pa.
 Atlas Supply Co., 108 Ring St., Philadelphia, Pa.
 Bates, George, 662 Shade St., Pittsburgh, Pa.
 Bennell, Chas. H., 261 No. Clarion St., Philadelphia, Pa.
 Bennett, C. H., 224 No. 13th St., Philadelphia, Pa.
 Catsiff, J., 1214 Market St., Philadelphia, Pa.
 Chamberlain Amuse. Enter., Inc., Shamokin, Pa.
 Columbia Film Service, 1010 Forbes St., Pittsburgh, Pa.
 Consolidated Film Co., 1237 Vine St., Philadelphia, Pa.
 Electric Theatre Supply Co., 1309 Vine St., Philadelphia, Pa.
 Gompertz, Abram B., Exhibitors' Clearing House & Supply Co., 1243 Vine St., Philadelphia, Pa.
 Hannson, J. G., 10th and Spring Sts., Reading, Pa.

Dealers

Hollis, Smith & Morton, 1024 Forbes St., Pittsburgh, Pa.
 Janicks, Michael, 1105 Gibbon St., Pittsburgh, Pa.
 Morton, Ed. B., 1006 Forbes St., Pittsburgh, Pa.
 Motion Picture Machine Co., 609 Neville St., Pittsburgh, Pa.
 National Theatre Supply, 1024 Forbes St., Pittsburgh, Pa.
 National Theatre Supply Co., 1311 Vine St., Philadelphia, Pa.
 Phila. Theatre Equip. Co., 252 No. 13th St., Philadelphia, Pa.
 Pittsburgh M. P. Supply Co., 1006 Forbes St., Pittsburgh, Pa.
 Rizzo, Clem, 262 No. 13th St., Philadelphia, Pa.
 S & S Film & Supply Co., A. Steinberg, 1026 Forbes St., Pittsburgh, Pa.
 Smith, Harry J., 436 Diamond St., Pittsburgh, Pa.
 Superior Motion Picture Supply Co., 1026 Forbes St., Pittsburgh, Pa.
 Swaab & Son, Lewis M., 1327 Vine St., Philadelphia, Pa.
 Williams, Browne & Earle, 918 Chestnut St., Philadelphia, Pa.
 Cadoret, William H., Theatre Supply Co., Scranton, Pa.
 Equipment Theatre Supply Co., Penn Ave., Scranton, Pa.

RHODE ISLAND

Allen Feature Film Co., Providence, R. I.
 McKenna, James, Providence State Ltg. Co., 12 Moulton St., Providence, R. I.
 Taylor, H. O. & E. S., 76 Dorrence St., Providence, R. I.

SOUTH CAROLINA

Independent Theatre Supply Co., 111 W. Coffee St., Greenville, S. C.

SOUTH DAKOTA

American Theatre Supply Co., Sioux Falls, S. D.

TENNESSEE

Consolidated Film & Supply Co., 226 Union Ave., Memphis, Tenn.
 Monarch Theatre Supply Co., 228 Union Ave., Memphis, Tenn.
 White Theatre Equipment Co., Phipps Bldg., Bristol, Tenn.

TEXAS

Atlantic Sales Co., 1816 Main St., Dallas, Tex.
 Dallas Theatre Supply Co., 1911 Commerce St., Dallas, Tex.
 National Theatre Supply Co., 306 So. Harwood St., Dallas, Tex.
 Peerless Film Svc., 322 San Antonio St., El Paso, Tex.
 Educational Equip. Co., 1913-A Commerce St., Dallas, Tex.
 Simplex Theatre Supply Co., Film Exchange Bldg., Dallas, Tex.
 Simpson, James P., Co., Inc., Dallas, Tex.
 Southern Film Svc., 811 Franklin Ave., Houston, Tex.
 Southern Theatre Equip. Co., 1815 Main St., Dallas, Tex.
 Thrash, R. D., Co., Film Row, Dallas, Tex.

UTAH

Alhambra Theatrical Co., Hudson Ave., Ogden, Utah.
 Argus Enterprises Co., Inc., 132 E. Second St., Salt Lake City, Utah.
 National Theatre Supply Co., 132 E. 2nd St., Ogden, Utah.
 Salt Lake Theatre Supply Co., 48 Exchange Pl., Salt Lake City, Utah.
 Universal Film & Supply Co., 56 Exchange Pl., Salt Lake City, Utah.
 Utah Theatre Supply Co., 125 E. 2nd South St., Salt Lake City, Utah.
 Worman Supply Co., 2429 Hudson Ave., Ogden, Utah.

VERMONT

Allen & Underhill, Chelsea, Vt.
 H. P. Boardman, Burlington, Vt.

Dealers**VIRGINIA**

Burchard, W. A., Co., 56 Commerce St., Norfolk, Va.
 Chocklett, Luther A., Co., Over Mt. Trust Bldg., Roanoke, Va.
 Southern Theatre Supply Co., 25 Old St., Petersburg, Va.

WASHINGTON, D. C.

Capitol Theatre Supply, 316 McGill Bldg., Washington, D. C.
 Carroll Electric Co., 714 12th St., N. W., Washington, D. C.
 Colman, 916 G St., N. W., Washington, D. C.
 Columbia Photo Supply Co., 1424 New York Ave., N. W., Washington, D. C.
 Fuller & D'Albert, 815 10th St., N. W., Washington, D. C.
 Higgins, F. L., 804 11th St., N. W., Washington, D. C.
 L & S Theatre Sup. Co., 908 G St., N. W., Washington, D. C.
 Theatre Supply Co., 916 G St., N. W., Washington, D. C.
 Lust, Sidney B., 916 G St., N. W., Washington, D. C.
 National Theatre Supply Co., 719 9th St., N. W., Washington, D. C.
 Scientific & Cinema Supply Co., 804 11th St., N. W., Washington, D. C.
 Southern Moving Picture Corp., 310 McGill Bldg., Washington, D. C.
 Thompson, E. B., 722 10th St., N. W., Washington, D. C.
 Washington Theatre Supply Co., 719 9th St., N. W., Washington, D. C.

WASHINGTON

Film Supply Co., 217 Virginia St., Seattle, Wash.
 Graham, John W., Spokane, Wash.
 Lowman & Handford, Seattle, Wash.
 National Theatre Supply Co., 1927 Third Ave., Seattle, Wash.
 Shearer, B. F., Inc., 210 Virginia St., Seattle, Wash.
 Spokane Theatre Supply Co., 410 W. 1st St., Spokane, Wash.
 Theatre Supply Co., 2016 Third Ave., Seattle, Wash.

WEST VIRGINIA

Charleston Elec. Sup. Co., Charleston, W. Va.
 Charleston Theatre Supply Co., Charleston, W. Va.
 Columbia Film Svc. Co., 707 Dryden St., Charleston, W. Va.
 Educational Film Co. of West Virginia, Charleston, W. Va.
 McGray & McGray Co., 329 Main St., Fairmont, W. Va.
 Standard Theatre Supply Co., 3608 Jacob St., Wheeling, W. Va.
 West Virginia Amusement & Film Co., 113 1/2 Capitol St., Charleston, W. Va.

WISCONSIN

National Theatre Supply Co., 715 Wells St., Milwaukee, Wis.
 Smith, Ray, Co., Toy Bldg., Milwaukee, Wis.
 Wisconsin Film Corp., 134 Grand Ave., Milwaukee, Wis.
 Wisconsin Theatre Supply Co., 174 2nd St., Milwaukee, Wis.

Manufacturers**Arc Lamps**

Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
 Burke & James, 425 So. Wabash Ave., Chicago, Ill.
 Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
 Cinema Studios Supply Corp., 1438 Beechwood Dr., Hollywood, Cal.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly, Inc., 129 Grand St., New York City.
 Hallberg, J. H., 445 Riverside Dr., New York City.
 International Projector Corp., 90 Gold St., New York City.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.

Manufacturers

Max Mayer Co., 218 W. 42nd St., New York City.
 Motion Picture Service Co., 417 W. 44th St., New York City.
 Mestrum, Henry, 817 Sixth Ave., New York City.
 Rollaway Motor Co., 122 Southard Ave., Toledo, Ohio.
 Strong Lamp Co., 3248 Monroe St., Toledo, Ohio.
 Wohl & Co., Inc., M. J., Paynter Ave. and Hancock St., Long Island City, N. Y.

Booths, Projection

A. G. Mfg. Co., Seattle, Wash.
 Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Blaw Knox Co., Bayard and Warner Sts., Baltimore, Md.
 Edward Mfg. Co., Cincinnati, Ohio.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Goldberg Bros., 1646 Lawrence St., Denver, Colo.
 Harry Steel Co., O. K., 2333 Papin St., St. Louis, Mo.
 Johns-Manville Co., 41st St. and Madison Ave., New York City.
 Keasbey & Mattison Co., Dept. N., Amhler, Pa.
 Langslow Co., H. R., 232 Jay St., Rochester, N. Y.
 Mestrim, Henry, 810 Sixth Ave., New York City.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newman Mfg. Co., 416 Elm St., Cincinnati, Ohio.
 Riverside Mfg. Co., Newark, N. J.
 Sharlow Bros., 442 W. 42nd St., New York City.
 Steel Roofing & Stamping Works, 506 S. W. 2nd St., Des Moines, Iowa.
 Thorp Fire Proof Door Co., Minneapolis, Minn.
 Williams, Browne & Earle, Inc., 918 Chestnut St., Philadelphia, Pa.

Carbons

Arco Electric Co., 110 W. 42nd St., New York City.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Diesman, J. D., Baltimore, Md.
 M. G. Felder, 1560 Broadway, New York City.
 Hiegel, Frank J., 440 State St., Schenectady, N. Y.
 National Carbon Co., Madison Ave., N. W., and W. 117th St., Cleveland, Ohio.
 Phellis & Co., C. W.
 Hugo Reisinger, 11 Broadway, New York City.
 Warner Prod. Co., Inc., 265 Canal St., New York City.

Cases and Cans, Reel Carrying

Ajax Film Accessories Co., 30 Church St., New York City.
 American Can Co., New York City, N. Y.
 Bass Camera Co., 109 No. Dearborn St., Chicago, Ill.
 Erker Bros. Optical Co., Olive St., St. Louis, Mo.
 Fulton Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Gotham Can Co., 57 Eagle St., Brooklyn, N. Y.
 Indestructible Metal Products Co., 521 W. 45th St., New York City.
 Los Angeles Can Co., Los Angeles, Cal.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newmade Products Corp., 249 W. 47th St., New York City.
 Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.
 Russakov Can Co., Chicago, Ill.

Cement, Film

Bass Camera Co., 109 N. Dearborn St., Chicago, Ill.
 Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
 Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
 Eastman Kodak Co., Rochester, N. Y.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 International Projector Corp., 1130 W. Austin Ave., Chicago, Ill.
 Monarch Theatre Supply Co., 1223 So. Wabash Ave., Chicago, Ill.
 Newmade Products Corp., 248 W. 47th St., New York City.
 Rothacker Film Mfg. Co., 1339 Diversey Pkwy., Chicago, Ill.

Manufacturers

Technical Color & Chem. Works, 523 Third Ave., Brooklyn, N. Y.
Weldon Film Cement Co., 301 Loeb Arcade, Minneapolis, Minn.

Film Safes and Cabinets

American Film Safe Corp.
Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
Columbia Metal Box Co., 226 E. 144th St., New York City.
Duplex Motion Picture Industries, 74 Sherman Ave., Long Island City, N. Y.
Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
Film Safe Co., 92 William St., New York City.
Agent for American Film Safe Corp., Baltimore, Md.
Fulton, E. E., 3208 Carroll Ave., Chicago, Ill.
Neumade Products Corp., 249 W. 47th St., New York City.
Peterson Co., C. J., 723 Fulton St., Chicago, Ill.
Sharlow Bros. Co., 442 W. 42nd St., New York City.

Film Splicing Machines

Bass Camera Co., 109 N. Dearborn St., Chicago, Ill.
Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
Burke & James, 425 So. Wabash Ave., Chicago, Ill.
Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
Duplex Machine Co., 317 Seventy-Fifth Ave., Brooklyn, N. Y.
Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
Gennert, Inc., G., 24 E. 13th St., New York City.
Griswold Machine Works, Port Jefferson, N. Y.
Lochran Film & Slide Co., Wm. A., 706 Film Exchange Bldg., Minneapolis, Minn.
Neumade Products Corp., 249 W. 47th St., New York City.
Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.

Lamps

Edison Lamp Works of the General Electric Co., Harrison, N. J.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
National Lamp Works, Nela Park, Cleveland, Ohio.
Westinghouse Lamp Co., 150 Broadway, New York City.

Lamps, Reflector

Besseler Co., Charles, 131 E. 23rd St., New York City.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
Goetz American Optical Co., 317 E. 34th St., New York City.
International Projector Corp., 90 Gold St., New York City.
Kliegl Bros. Universal Stage Light Co., Inc., 321 W. 50th St., New York City.
McAuley Mfg. Co., J. E., 552 W. Adams St., Chicago, Ill.
Morelite Co., Inc., 600 W. 57th St., New York City.
Preddy, Walter G., 187 Golden Gate Ave., San Francisco, Cal.
Warren Products, 265 Canal St., New York City.

Lights, Spot

Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
Best Devices, 22 Film Bldg., Cleveland, Ohio.
Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
Burke & James, 425 S. Wabash Ave., Chicago, Ill.
Capitol Stage Lighting Co., 626 Tenth Ave., New York City.
Chicago Electric Sign Co., 2219 Grand Ave., Chicago, Ill.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
De Bus, Al., 1072 N. Wilton Pl., Hollywood, Cal.
Diesman, J. F. D., Baltimore, Md.
Display Stage Lighting Co., 334 W. 44th St., New York City.
Enswistle, R. C., 304 W. 52nd St., New York City.
Erikson, Electric Co., L., 6 Portland St., Boston, Mass.

Manufacturers

Franklin Electric Products Co., 750 Prospect Ave., S. E., Cleveland, Ohio.
Frink, Inc., I. P., 24th St. and Tenth Ave., New York City.
General Electric Co., Schenectady, N. Y.
Hall & Connelly, 129 Grand St., New York City.
Hubb Electric Co., 2219 W. Grand St., Chicago, Ill.
Kansas City Scenic Co., 24th and Harrison Sts., Kansas City, Mo.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Klouchek, Chas. E., 528 Flanders St., Portland, Ore.
Mestrum, Henry, 817 Sixth Ave., New York City.
Motion Picture Service Co., 417 W. 44th St., New York City.
Newton, Chas. I., 224 W. 14th St., New York City.
Perkins Electric Co., 21 Wilton Sq., Toronto, Ont.
Sun Ray Lighting Co., 119 Lafayette St., New York City.
Universal Stage Lighting Co., 321 W. 50th St., New York City.
Wheeler Green Electric Co., 29-39th St., Rochester, N. Y.
Wohl & Co., M. J., Hancock St., Long Island City, N. Y.

Projectors

American Motion Picture Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Baird Motion Picture Machine Co., 31 Runyon St., Newark, N. J.
Bell & Howell Co., 1801 Larchmont St., Chicago, Ill.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
International Projector Corp., 90 Gold St., New York City.
Kaplan, Sam, 729 Seventh Ave., N. Y. City.

Reels, Film

Acme Stamping & Mfg. Co., Pittsburgh, Pa.
Duplex M. P. Industries, Inc., Long Island City, N. Y.
Geometric Stamping Co., 221 E. 131st St., Cleveland, Ohio.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, Ohio.
Goldberg Bros., 1646 Lawrence St., Denver, Colo.
Heigel, Frank J., 440 State St., Schenectady, N. Y.
Mossberg Co., Frank, Attleboro, Mass.
Neumade Products Corp., 249 W. 47th St., New York City.
Sharlow Bros. Co., 442 W. 42nd St., New York City.
Taylor-Shantz Co., 478 St. Paul St., Rochester, N. Y.
Winship & Sons, W. W., Utica, N. Y.

Reflectors, Light

American Reflector & Lighting Co., 100 So. Jefferson St., Chicago, Ill.
Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
Curtis Lighting Co., 1119 W. Jackson Blvd., Chicago, Ill.
Erickson Electric Co., 6 Portland St., Boston, Mass.
Frink, I. P., Inc., 239 Tenth Ave., New York City.
General Outdoor Advertising Co., 550 W. 27th St., New York City.
Heinrich Reflector Co., 645 W. 43rd St., New York City.
Hub Electric Co., 2219 W. Grand Ave., Chicago, Ill.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Major Equipment Co., Inc., 4603 Fullerton Ave., Chicago, Ill.

Rewinders

Atlas Metal Works, Dallas, Texas.
Automatic Film Rewinder, Harrisburg, Pa.
Bass Camera Co., 109 Dearborn St., Chicago, Ill.
Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill.
Best Devices Co., 1514 Prospect Ave., Cleveland, Ohio.
Duplex Machine Co., 316-75th St., Brooklyn, N. Y.
Electrical Prods. Corp., 1122 W. 16th St., Los Angeles, Cal.
Lang Mfg. Works, Olean, N. Y.
Neumade Products Corp., 249 W. 47th St., New York City.
Stern Metal Works, 1006 Vine St., Philadelphia, Pa.

Manufacturers**Rheostats**

Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
Cuttler Hammer Mfg. Co., Milwaukee, Wis.
Duplex M. P. Industries, Inc., Long Island City, N. Y.
General Electric Co., Schenectady, N. Y.
Hall & Connelly Co., 129 Grand St., New York City.
Hertner Electric Co., 1900 W. 112th St., Cleveland, Ohio.
Hoffman & Sons, 522 First Ave., New York City.
Hub Electric Co., 2219 Grand Ave., Chicago, Ill.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Leonard Electric Mfg. Co., 3709 Perkins Ave., Cleveland, Ohio.
Newton, Chas. I., 331 W. 18th St., New York City.
Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
Wheeler-Green Electric Co., 29 St. Paul St., Rochester, N. Y.

Screens

American Silversheet Co., 915 Washington St., St. Louis, Mo.
Da-Lite Screen Co., 922 W. Monroe St., Chicago, Ill.
Diamond Screen Products Co., 1222 Ontario St., Cleveland, Ohio.
Gardiner Co., L. J., 1021 W. Goodale Blvd., Columbus, Ohio.
Minusa Cine Screen Co., 2665 Morgan St., St. Louis, Mo.
Mirror Screen Co., Shelbyville, Ind.
National Screen Co., 2100 Payne Ave., Cleveland, Ohio.
Premier Screen Co., P. O. Box 861, Roanoke, Va.
Raven Screen Corp., 1476 Broadway, New York City.
Rembusch Screen Co., Shelbyville, Ind.
Roval M. P. Screen Co., 910 Manhattan Ave., Brooklyn, N. Y.
Spencer Lense Co., 442 Niagara St., Buffalo, N. Y.
Story Scenic Co., 21 Tufts St., Somerville Sta., Boston, Mass.
Trans-Lux Daylight Picture Screen, Inc., 247 Park Ave., New York City.
Walker Sunlight Screen Co., 359 Canal St., New York City.
Werstner & Son, C. S., 211 N. 13th St., Philadelphia, Pa.
Western Shade Cloth Co., 22nd and Jefferson Sts., Chicago, Ill.

Slides

Acme Slide Studio, 1026 Market St., San Francisco, Cal.
American Slide Co., 165 No. High St., Columbus, Ohio.
Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
Excelsior Illustrating Co., 219 Sixth Ave., New York City.
Kansas City Slide Co., 1015 Central St., Kansas City, Mo.
Lochran, Wm. A., Film Exchange Bldg., Minneapolis, Minn.
Midland Cine Products Co., 706 First Ave., North Minneapolis, Minn.
Milano Slide Co., 112 W. Broadway, Salt Lake City, Utah.
Niagara Slide Co., Lockport, N. Y.
Paramount Publicity Corp., 111 Westchester Sq., Bronx, N. Y.
Radio Mat Slide Co., 167 W. 48th St., New York City.
Ransley, J. F., 337 Madison St., W. Chicago, Ill.
Standard Slide Co., 209 W. 48th St., New York City.
Unique Slide Co., 168 W. 48th St., New York City.
Victor Animatograph Co., Davenport, Iowa.

Tachometers

Weston Electric Instrument Co., 4 Western Pl., Newark, N. J.
Blanchard Instrument Co., Cambridge, Mass.
Consolidated Instrument Co., 41 E. 42nd St., New York City.

Meters, Electrical

Weston Electrical Instrument Corp., 7 Weston Pl., Newark, N. J.
Jewell Electrical Inst. Co., 2 Vesey St., New York City.

When writing to Manufacturer or Dealer for information please mention the MOTION PICTURE PROJECTIONIST

Are You Co-operating ?

FREE use of the columns of THE MOTION PICTURE PROJECTIONIST is extended to all Projectionists in this country and in Canada for the publication of news items, feature items, photographs, etc. No articles of political or controversial nature will be accepted, but everything else that will help to entertain or to instruct will be gladly published and full credit given. Whenever possible send the following:

News Items about yourself and other Projectionists. Report as often as you can the progress your Local is making. Pass it on to the rest of the boys in the country.

Feature articles on the Science and Art of Projection from your own experience. Be entertaining if you like or be instructive. Send along all photographs or diagrams that go with it.

Pictures of yourself.

Reports of stunts you have devised for your booth to make projection easier or more efficient and diagrams of these stunts.

Questions about Projection problems that bother you. They will be answered promptly by experts in a special department called Questions and Answers about Projection.

News from Locals will be published under a heading devoted exclusively to the Local from which the news comes. Every Local in the country will have its own corner in this publication.

Generators

(Continued from page 7)

insulation. If the excessive heating is uniform over the whole armature, the machine is overloaded.

Should one or two of the coils be overheated, the trouble is due to a short circuit in the winding. If the core is hotter than the coils, the trouble is due to excessive eddy currents in the laminations, caused by the core rubbing against one of the pole faces, or it may be caused by a number of the laminations being short circuited, the result of slots having been filed too much when the core was built.

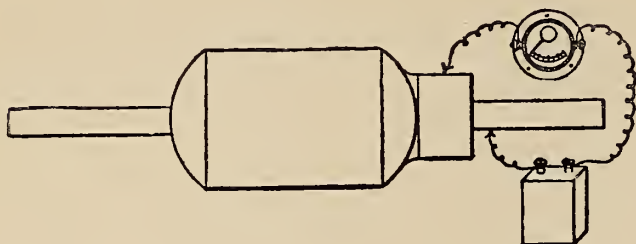


Fig. 3

Heating due to eddy currents, either in the armature core or the conductors, cannot be remedied by the projectionist, and the maker of the machine should be notified immediately. The test for this trouble is to run the generator on open circuit and take note of the rise in temperature. To test for a ground in the windings, first disconnect the generator from the circuit, and then run it up to normal speed. Using an ordinary test lamp, touch the opposite brushes to make sure that you have the voltage. Then connect the lamp terminals between the generator frame and the poles. Should there be a ground, the test lamp will either glow or light. The cause of the ground should then be located and removed.

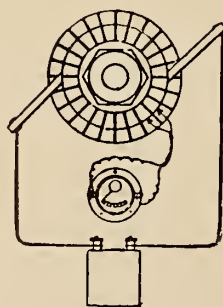


Fig. 4

Locating Ground Coil

Locating a grounded coil is a difficult task, and should not be undertaken by anyone who is not familiar with electrical apparatus. The armature should be removed from the field and set on trestle; a current (not exceeding the normal current of the dynamo) should be passed through the armature from any one of the commutator segments to the shaft. A compass should be held near the conductors, and the needle will be deflected in a certain direction due to the flow of current. If the armature is slowly turned around, until such time as the compass needle reverses, this will indicate the proximity of the grounded coil.

You Are the Show

(Continued from page 9)

work to see that you have a good screen, properly set. Disregard of any of the foregoing means the dispelling of the illusion, and when the illusion has been broken there simply cannot be satisfactory entertainment. A projectionist who feels the urging to project a perfect show is a true artist in his work. And without this inner urge to give the picture every possible advantage in presentation, one is not an artist but a mechanic only.

To my mind, the first consideration in the qualifications for a good projectionist is the will to learn—the will to progress, to learn and to try new things. A very important consideration is cleanliness—cleanliness of one's own person and the desire for cleanliness of everything about one. These theatres of today constitute a challenge to every member of the projectionist craft. Better theatres demand better projection; and if we haven't that will to learn, to progress, that openmindedness that invariably spells advancement for the projectionist alive to his work, we shall have to give place to other men who are willing to grow along with the demands of this great industry.

Look about your projection room today. What do you see there? You will probably see three projectors, effects, spots, slides, floods, and much more equipment—all resulting from someone's constant plugging along the trail of an idea. You may be sure that all these improvements are the result of the work of men who realized the importance of better projection—and the importance of the projectionist: the very idea I am urging you to adopt as your everyday attitude toward your work.

In the future the quality of work that will be done from the projection room will be very effective, and, I might say, not a little surprising. Every day there are new developments announced, new experiments launched, new ideas given birth to. When the moment comes to put these ideas into operation, it will be the projectionist who has nurtured the will to learn who will get the call. These new theatres with their elaborate programs constitute a constant demand on the resources of the projectionist craft. There are no sidelines in this game: the projectionist who is today giving the perfect show in no matter how small an out-of-the-way town is almost certainly marked for advancement. I have seen a shift like this occur many times: a projectionist in a small theatre suddenly getting the call for an important post in a de luxe theatre; a surprise to his friends, who wonder why. The "why" about it is that probably the man and his work were under observation long before he got the call. And, incidentally, the giving of a perfect show in a small, probably poorly equipped theatre, is a *real job*.

Just the other day a projectionist was heard to remark to a brother projectionist, "You know, this business, with its Vitaphone and its Movietone and all the other new things popping every day now, is coming to the point where a fellow either has to know his stuff or he won't work." And that remark seems to me to sum up the gist of this article—be openminded, be alert, be alive to the new developments in your craft, develop the will to learn, be conscious of your own importance—be prepared!

But whether you are on Broadway or in Yap Center, remember one thing: you are the show, and you must thoroughly sell yourself this idea. Good equipment and lots of it, \$1,000,000 per picture, fine photography, de luxe theatres, elaborate programs, and everything else notwithstanding—sell yourself this idea:

You are the show!

Radio Movies and the Theatre

(Continued from page 13)

Sunday Star
WASHINGTON, D. C., SUNDAY MORNING, JUNE 14.

"Radio Vision" Shown First Time In History by Capital Inventor
C. Francis Jenkins' New Wireless Apparatus Depicts Moving Objects Miles Away—U. S. Officials See Test.

"Radio vision," long the fantastic dream of science, became an accomplished fact yesterday afternoon, with Secretary of the Navy Wilbur and other high Government officials witnessing the feat.

With the aid of a remarkable apparatus invented by the Washington scientist, C. Francis Jenkins, the Secretary of the Navy, Dr. George M. Burgess, director of the Bureau of Standards, Admiral D. W. Taylor, Chief, Paul Foley of the Naval Research Laboratory and others actually "saw" by radio an object at motion several miles distant in front of a "radio eye" installed at the Naval Radio Station, NOF, at Bellevue, D. C.

It was heralded as the first time in history that man has literally seen far-away objects in motion through the uncanny agency of wireless.

As Secretary Wilbur watched the image of a revolving propeller, selected as the "subject" to be broadcast, as it appeared on a small screen in the Jenkins laboratory, at 1519 Connecticut avenue, he remarked: "I hope we'll be sitting at our desks during the next war and watching the battle in progress."

"That's perfectly possible, Mr. Secretary," the inventor replied seriously. The demonstration was of a strictly private nature and, in the words of Mr. Jenkins, did not pretend to be a "show."

"It is merely a scientific test that proves we have attained our goal," Mr. Jenkins told his visitors. "By making numerous improvements in our sending and receiving machines we expect to be able shortly to stage a 'radio vision show' with the latest performance at the broadcasting station and the audience watching the performance at the receiving studio miles distant."

What the officials saw yesterday afternoon was the image of a small cross revolving in a beam of light flashed across a light-sensitive cell at Station NOF. No other objects were used in the test. The image, while not clear cut, was easily distinguishable.

Director Burgess of the Bureau of Standards, in congratulating the inventor, said: "You've certainly got it all right, if my eyes aren't deceiving me."

(Continued on Page 4, Column 5)

example, Gregory, who shows us the many tricks and avenues of application possible with movies; Mr. Eastman, who refines an essential in the new industry; Mr. Howell, who produces splendid tools to work with; Power, Porter, and Roebuck, who give us a standardized projector, through the projection aperture of which all the millions and millions of profits have come; then the coordinators who make a business of the whole, too many to name them.

I have no doubt but that Radio Movies will follow almost exactly that program.

And Radio Movies will appeal with the combined mystery of radio and the fascination of the picture story in pantomime, guaranteeing a permanent revenue never before equaled, for we all love picture stories, and never outgrow them.

I have no doubt but that the Jenkins Laboratories would have finished Radio Movies last year except for the necessity of developing broadcast Weather Maps, to be picked up by radio aboard ships. This is now an accomplished fact, officially accepted and used by ships at sea and ships in the air. So it is hoped that we may now resume the refinement of Radio Movies. There is no need to wait until some new element or principle is discovered, as has been asserted, for it is an accomplished fact now, and everything we need for its refinement is in hand.

This was conclusively proved when, on June 13th, 1925, I demonstrated both Radio Movies and Radio Vision between the Navy Radio Station NOF, at Bellevue, and my laboratories in Washington. There were present at this demonstration, as I recall, Secretary Wilbur of the Navy; Admirals Taylor and Robinson, Captains Foley and Tompkins; Acting Secretary Judge Davis, of the Department of Commerce, and with him Radio Director W. D. Terrell, and Dr. George K. Burgess, Director of the Bureau of Standards.

These gentlemen saw on a small screen in my laboratory in Washington, June 13, 1925, what was actually happening at the moment in the Navy Radio shack some miles away at Bellevue, across the river. A front-page description of the demonstration was printed in the next day's Washington papers, the *Sunday Star* and the *Sunday Post*, and was broadcast by the Associated Press. It must have gone far, for I had a cablegram of congratulation Tuesday morning from a friend in Paris, France.

And my demonstrations have shown that acceptable Radio Movies are easier to make than acceptable stills, principally because it is the story told in the moving picture, not its technical quality, which attracts.

Perhaps you may say: "But, you require such terrific speeds." Certainly, more than ten thousand times the speed of the stills. So, as there are limits to mechanical speeds, we adopt the most practical speed for our purpose and then attain the necessary increase in speed by multiplying the light sources, which, sweeping across our screen, make up the picture. Already we have used four light sources, controlled by the pulsing of four corresponding light-sensitive cells at the transmitter, and carried by a single radio wave.

"What, a single carrier? That is impossible." Certainly, I admit that it is impossible, until one knows how to do it; just as a solid glass prism which changes the angle between its faces was impossible, until the development of the Prismatic Ring.

We also find a fluorescent screen helpful, for its per-

theatre attendance; it will increase it. If one only cultivates in the public a liking for anything, habit will add its saving grace.

Mr. Bryan introduced the telephone to the public by putting free phones in every drug store in Washington, a silent invitation to call up friends. Secretly I think we felt a little pride in using the new invention, and it cost nothing. A year later he put coin-slot boxes on the phones. And then there was a howl for sure. But we couldn't stop using phones; they had found a useful place in our daily habit.

May I take a moment more to cite a case nearer analogous to Radio Movies in the home. Not far from my residence in Washington a picture theatre was having a hard time because of poor attendance. When a friend of mine bought it I said to him: "Harry, few people in this section of the city have the picture habit. Give me some pictures to show on my lawn every Saturday night this summer and I will build up a good attendance for you." And that is just exactly the way it turned out.

But to get back to my subject—it is time to give the public Radio Movies for home entertainment. The public is ready; radio is ready; and movies are ready; and every element necessary to complete an acceptable machine is in hand. So the pioneer should be expected soon. I think he is due now. Doubtless Radio Movies will follow the same program other inventions have followed, like film movies, for illustration.

The membership of the Society of Motion Picture Engineers covers the entire range of the movies' growth. There is the pioneer, Jenkins, if you will permit the presumption; then the explorer in the new thing, for

Radio Movies and the Theatre

sistence of impression greatly assists persistence of vision. And brief persistence of screen impression is better than persistence of light source alone, for the screen impression remains in its initial position, while persistence of light source moves on and dulls desirable sharpness in the screen picture. Although, in fact, we use both methods on occasions.

I have no doubt we could also give you music or speech with Radio Movies, or both sight and sound when in Radio Vision we transmit from living subjects or outdoor scenes, as from beautiful dancers, or an exciting baseball game. But who wants "talking movies"? Except for its transient novelty, *talking* movies will, in my opinion, have no great or permanent attraction for the public. Quite likely recorded music will be substituted for the orchestra accompaniment to pictures.

"Talking pictures" are an anomaly. If the pantomime picture tells the story, please, then, why the talk? It is with murder in our hearts that we hear our next-seat neighbor tell us what the story is in the picture at which we are looking. All stories, as well as other facts, are recorded in our minds as pictures. It is a picture you pull out of your memory files, not a written description of a boyhood scene or activity. Even when we *listen* to a story, we enjoy most the narrator who is the best "word picture" painter. With our eyes shut we make our best mental designs, for with lowered eyelids we close the curtains on all distracting scenes, as we build up, modify and finally accept our finished mental picture, before we transfer it to paper.

So we shall not spend time on talking Radio Movies; leaving this work to others, for there are thousands of workers in audio radio. There will be occasions where audible radio will be useful, but they will be few where "talking" movies will be worth the added cost. So as time is short in any event, our task is straight Radio Movies and Radio Vision for home entertainment.

In due course, then, folks in California and in Maine, and all the way between, will be able to see the inaugural ceremonies of their President, in Washington; the Army and Navy games at Franklin Field, Philadelphia; and the struggle for supremacy in our national sport, baseball.

The new machine will come to the fireside as a fascinating teacher and entertainer, without language, literary, or age limitations; a visitor to the old homestead with photoplays, the opera, and a direct vision of world activities, without the hinderance of muddy roads or snow blockades, making farm life still more attractive to the country-bred boys and girls.

Already audible radio is rapidly changing our social order; those who may now listen to a great man or great woman are numbered in the millions. Our President recently talked to a majority of the citizenship of the United States at the same time.

When to this audible radio we add visible radio, we may both hear and see great events: inaugural ceremonies, a football, polo or baseball game; a regatta, Mardi-Gras, flower festival, or baby parade; and an entire opera in both action and music. This we shall soon take up for completion, and with the utmost confidence, for dollars and brains can do most anything. Brains some times without the dollars, but never dollars without brains, without the know-how.

"But, Jenkins, when may we expect this wonderful buggy ride?" "Why, just as soon as I get the benzine to make it go, I've got the buggy."

Electrical Hints

By Wesley Trout

NEVER use any resistance device in series with a transformer.

Place transformer away from metal walls of projection room.

Never use less than 60 amperes with alternating current at the arc.

Always make sure that all electrical connections are TIGHT.

Always make sure that the primary coil (always marked "line") is connected to the source of supply.

Don't overload your carbons.

Keep your generator CLEAN.

The frame of a generator set should be thoroughly grounded by means of a copper wire, one end of which should be connected to a good ground.

Remember that any wire splice should be made both mechanically and electrically perfect before you solder it. The wire should always be scraped clean and bright before making a splice.

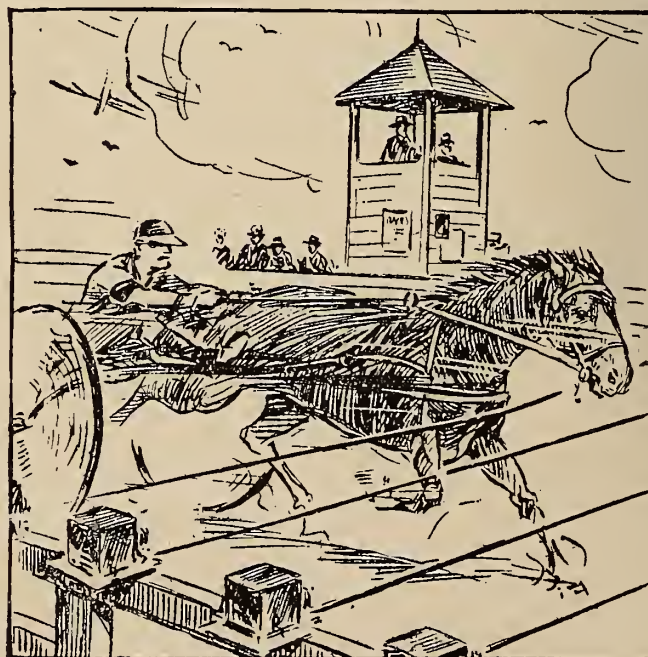
When installing switches it is better that the blade of the switch be dead when the switch is open.

Remember that R. C. wire is the only kind to use in conduit.

Never load wires beyond their normal capacity because the waste is registered on the meter, and *it is very dangerous.*

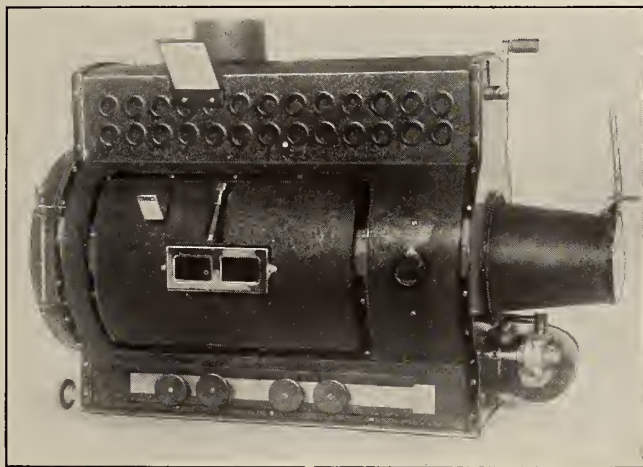
New brushes for generators should always be of the same make and grade as those shipped with the machine, thus insuring best results.

A test lamp should be in every projection room.



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Say "YES" When the Owner Asks If You Want *Sentry Safety Control*

IN an article in the Dec. 3 issue of *Motion Pictures Today*, the author, Mr. E. T. Keyser, lists a series of film-fires in each one of which the projectionist was severely burned. He concludes his editorial by saying:

"... It certainly constitutes something for the projectionist to think about when the boss asks him if he doesn't think it would be a good idea to install a Sentry Safety Control which renders such occurrences an impossibility."

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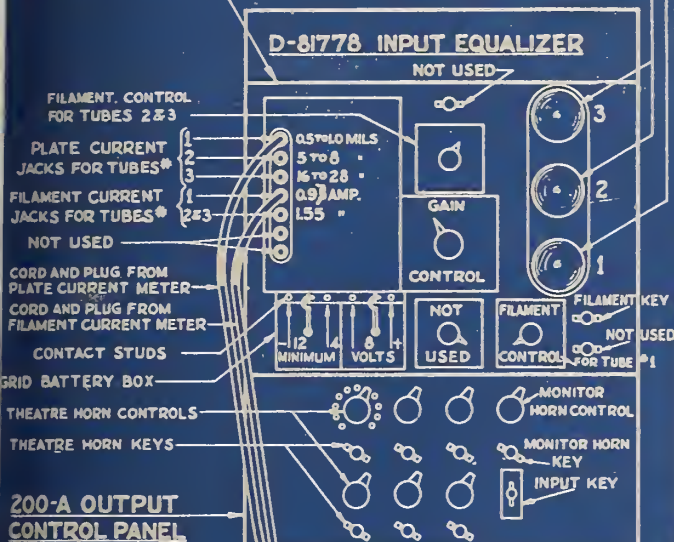
PROJECTIONIST

VITAPHONE CONTROL PANEL

102 TYPE VACUUM TUBE
205 TYPE VACUUM TUBE

6000-A RECTIFIER

8-B AMPLIFIER



Beginning in
this issue a
series of
articles
on

V
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by
J.J.KIELEY
and
M.W.COPELAND

FEBRUARY
1928

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EDITOR,
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Best Craft Publication

EDITOR,
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Enclosed please find six subscriptions for your publication. The members who have seen the magazine declare it is far superior to anything in its line and deserves to be a great success.—JAMES HOLLY, Secretary, Local 396, Binghamton, N. Y.

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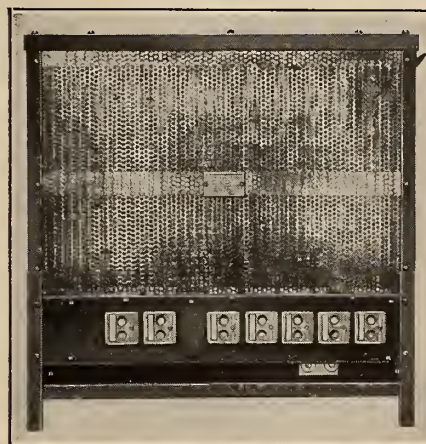
Sure a Great Paper

EDITOR,
MOTION PICTURE PROJECTIONIST:
THE MOTION PICTURE PROJECTIONIST sure is a great paper. Keep up the good work.—WALLACE GUTZY, State Theatre, Minneapolis, Minn.

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BURNS vary in severity from mere scorches to the production of blisters or even to the burning of the entire thickness of the skin (scorches 1st degree, production of blisters 2nd degree, burning of the entire thickness of the skin 3rd degree). The pain of the first and second degree burns can be relieved by application of 1% watery solution of picric acid. Water cannot take up more than 1% of picric acid; the acid crystals lie at the bottom of the bottle and water may be added from time to time as the solution is used up but, as long as the crystals are still to be seen, it is safe to assume that a standard 1% solution still is present. The best way to keep the solution in contact with the skin is to place dry cotton on the skin and then pour the solution on the absorbent cotton from the bottle. The solution stains everything an intense yellow and therefore care must be taken not to get it on clothing. A bandage will hold the cotton in place until tour of duty is finished when it would be wiser to have a surgeon familiar with treatments of burns see and dress the wound.

For the severer grades of burns, a freshly made up 5% solution of tannic acid in water is applied to the burnt parts in the form of a wet dressing, i.e., gauze or cotton, wet, covered with rubber tissue to prevent evaporation, and held in place with a bandage. This tannic acid solution relieves pain and should be kept on for from 24 to 48 hours. Here too it is wiser to have a surgeon follow the after-treatment, especially if infection occurs. The degree of local burning is of far less importance than the extent of surface burnt. Burns of more than one-third of the body surface are rarely recovered from.

Cuts should be immediately treated, with an antiseptic (tincture of iodine), the skin being moved so as to separate the lips of the cut and allow the solution to go to the very bottom. Sterile gauze should then cover the wound held in place by a bandage. *Do not use a cut finger.* Keep it

quiet; motion prevents healing. If you cannot move your finger after it is cut, even though the cut itself is small, this means that the tendon has been divided and must be operated on to join the divided ends as soon as possible, preferably within a few hours after the injury. If a hemorrhage from a cut of the hand or arm is severe, direct compression by means of a folded handkerchief or piece of gauze to the wound is generally sufficient. Maintain this pressure either by the fingers or by a firm bandage and go immediately to a hospital so that the bleeding vessels can have their mouths closed. Elevation, i.e., holding the arm and hand up, always lessens hemorrhage. Do not keep on wiping the wound, but apply the pressure as just stated. Normal clotting time is 4 minutes. Do not remove the dressing at the end of this time to see whether bleeding has ceased, because you may tear loose the clot and start bleeding once more. A cut which opens into a joint or tendon sheath should be immediately seen by a surgeon to prevent infection if possible.

Ventilation: The control of ventilation in the projecting room is of the utmost importance. The carbon monoxide gas from combustion of carbon at the point of the arc is just as deadly as that from the exhaust pipe of an automobile and adequate provision for carrying off this deadly gas is essential to protect projectionists from carbon monoxide poisoning. The projecting room must be kept cool in summer and must be guarded from drafts in winter. A projectionist who is standing alongside of his machine, subjected to drafts, will be constantly subject to colds, and likewise inadequate ventilation at all times sooner or later makes a sick man. To work efficiently one must have air which is fresh, and neither too warm nor too cold.

Lastly, light leaks from arcs must be prevented but the injuries from too intense light to the eyes is so well known that it hardly deserves special mention.

THE MOTION PICTURE PROJECTIONIST

A Magazine Devoted to Projection and Projectionists

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and M. W. Copeland*

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Note: The Motion Picture Projectionist does not assume responsibility for the statements and opinions appearing in signed articles in its columns. The leading experts in each phase of projection are asked to contribute and they are free to express their own theories and experiences. Accuracy alone is insisted upon.



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Vitaphone: What Is It?

By JOHN J. KIELEY & M. W. COPELAND

THE moving picture industry has always had a keen desire to some day project the human voice along with the picture. As far back as twenty years ago, when even pictures were technically imperfect, theatre managers took great pleasure in announcing "talking" pictures as part of their program. And it never failed to fill the house.

At that time these "talking" pictures were accomplished by having some one stand in back of the screen and talking, singing or shouting just at the time the actor on the screen was doing it. But oh! what synchronism! About the time the villain dropped to the floor having been fatally shot, someone in back of the screen would find the gun and shoot.

The development of the phonograph by Thomas A. Edison, the transmission of the voice over wires by Dr. Graham Bell and Dr. Watson, and the development of the radio by Dr. Lee DeForrest have been the cornerstones of talking pictures as we know them today.

Having spent a great deal of time in the study, installation, maintenance and in the practical operation of the Western Electric Sound Projector System, better known as VITAPHONE, from the time of the first installation of the apparatus at Warners Theatre on Broadway, New York, and also having developed some of the special pieces of the mechanism now used as part of this equipment, I feel it my duty to acquaint my fellow craftsmen with details of its construction and operation. This series of articles will include pointers on avoiding and remedying the most frequent troubles of the Vitaphone operator along with diagrams and sketches showing how the apparatus works, and also important information on the amplifying system now used.

Although the theory and construction of the apparatus is both interesting and important, the projectionist is chiefly concerned with the problem of starting and shutting down the equipment; how to set the controls to get the best effect in his particular theatre; to know the functions of the various units of the controls and to be able quickly to locate trouble, and even more important, how to prevent trouble.

The proper reproduction of the voice on the record, that is, its tone qualities, power, etc., is the responsibility of the studio staff. The proper synchronization of the voice with film, that is, the speed of the action is also up to the studio staff. The projectionist is concerned only with the duties of properly handling this equipment in the booth—and that is a big job and demands quickness of mind, skill at manipulating the instruments, carefulness in adjustments and an ever-present watchfulness. It's a big job and every projectionist should absorb as

much information about it as possible before he tackles it.

Principles of the Equipment

The flat-like phonograph record is used to produce speech or music which is picked up by a device called a reproducer that generates small electric currents that are variable according to the various impressions made thereon; this current is then passed through amplifiers like those used on radio receivers and known as "Audio-Amplifiers." From the amplifier the current is conveyed to loud speaking horns located near the screen. The phonograph record is synchronized with the film; that is, the two are geared to operate in step with each other at a constant speed, always starting and stopping at a given point on both film and record at each performance. This is accomplished by means of a shaft connecting the moving picture machine with the phonograph turntable. This you can readily see makes one machine of the two pieces of apparatus so that no part can go any faster than the other at any time.

Plate one shows the moving picture machine and the reproducer. The phonograph record is mounted on a special stand.

The plate reproduced on the cover is constructional diagram of the control panel. Plate five is rear view of same panel, showing the various fuses and sizes.

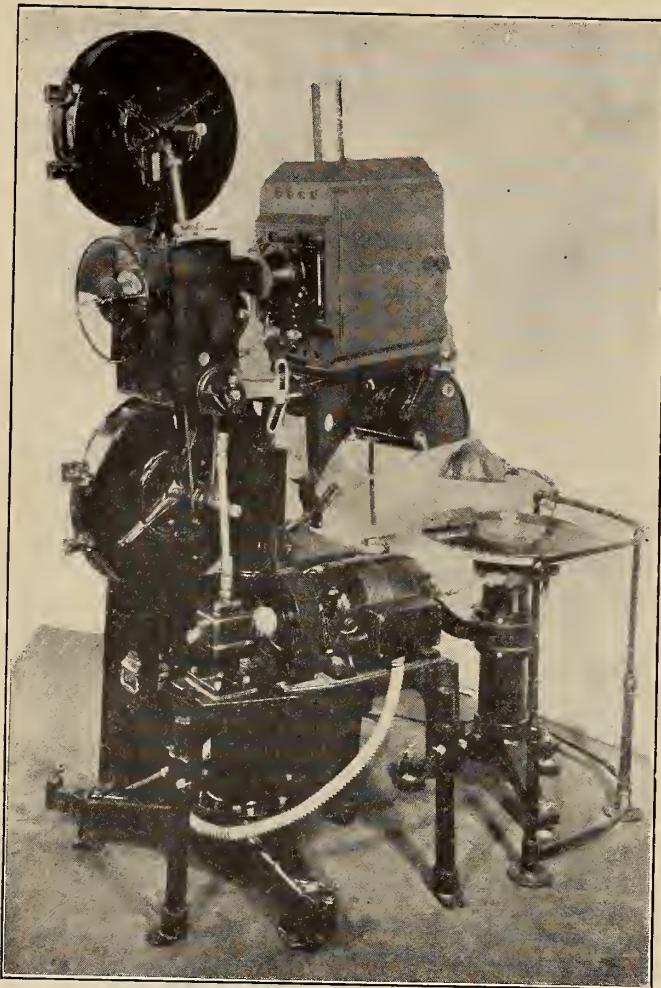
Beginning with the next issue full description of each unit of Vitaphone will be given with diagrams and photographs and the operation and function of each unit will be fully explained.

Let us pause to note that while Vitaphone is complicated to the average person it becomes less complicated if we decide first what we are going to do. The phonograph record is a record of sound waves, that is, music, voice, etc.; a record of something that has already taken place, and is now in the form of indentations on a piece of hard rubber that must be transformed into sound. But instead of reproducing sound we first generate small feeble electric currents by the use of an electric reproducer and pickup needle. This is the first step made in reproducing sound electrically.

The second step is to take these small feeble currents produced by the electric reproducer and pickup needle and pass this feeble current through a device that increases or amplifies these small feeble currents to currents that are strong enough to do some work. These currents are filtered of all stray currents that produce scratchy sounds, and the current is then conveyed by means of wires to loud speaker horns located near the screen. These currents move a small armature that in turn is mechanically connected to a diaphragm that when moved



John J. Kieley



Vitaphone Record Geared to Projector

causes air currents to be set up at the base of the horn; the result is, of course, sound. This sound should be exactly the same as that produced by the artist, if the electric circuits are functioning properly, and assuming also that the phonograph record is perfect.

(Continued in next issue.)

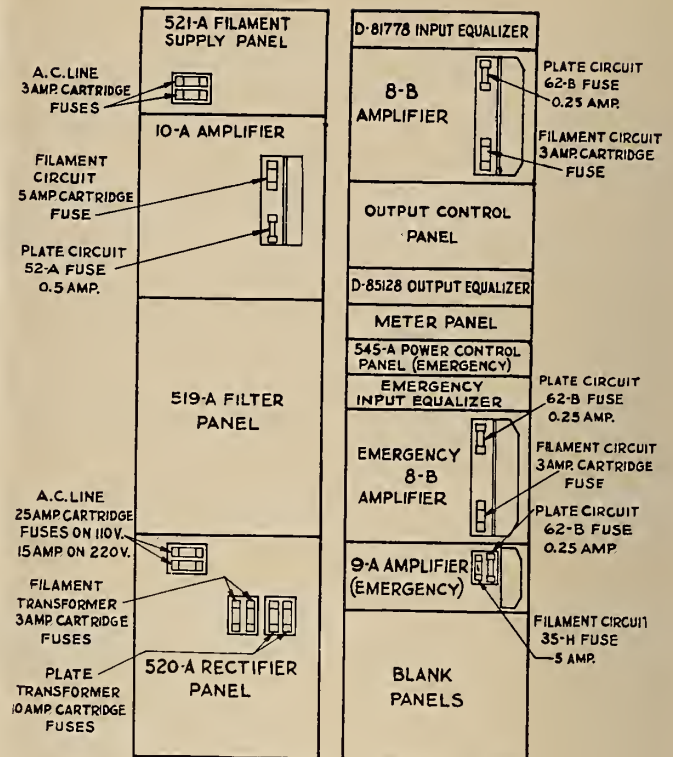


Diagram of Rear of Control Panel

J. J. Kieley was formerly installation manager for the Vitaphone Company and is considered an authority on the subject from the practical and theoretical angle. Years before the introduction of talking pictures as a commercial proposition, Mr. Kieley was experimenting with "talkies" and was the first one drafted by Vitaphone from Projectionist ranks to help it with its equipment. He is a member of Local 306.

M. W. Copeland is a well-known laboratory engineer and has been conducting experiments in electrically reproduced sound for many years.

Both Mr. Kieley and Mr. Copeland will personally answer all inquiries concerning Vitaphone. Address them care of THE MOTION PICTURE PROJECTIONIST.

How Many of These Can You Answer?

Send Answers to Question Editor,
THE MOTION PICTURE PROJECTIONIST

What is meant by a constant-current type of a current rectifying device?

What are the advantages of a three-wire system?

What is a transformer? How is it constructed? How does it work?

The primary coil of a transformer is supplied with a current of 25 amperes at 2,000 volts, the pressure at the secondary being 250 volts. What is the current from the secondary coil?

How would you find the amount of resistance offered by any conductor?

What percentage of light is lost between the arc lamp and the screen, and where in the optical circuit do these losses take place?

On which coil of a transformer, the primary or the secondary, is the greatest wattage?

What is meant by the "International Ohm"?

What is meant by "intermittent gear ratio"?

What would be the trouble if a new motor should gradually build up speed until it runs at a very excessive speed?

Effect Lighting

By J. H. KURLANDER

Director, Engineering Dept., Brenkert Light Projection Co.

MOTION picture programs today, especially as found in many of the de-luxe houses, represent a combination of the earlier "straight movie" show with a trimming of vaudeville numbers formed against a musical background provided by an organ, orchestra, or stage band.

There are exceptions to this formula, of course, but animate performers, assisted by music provided by one or more means, are used to supplement the motion pictures, which still constitute the principal body of the program.

With the fusion of these two, hitherto widely separated types of entertainment, it was only natural that the theatrical atmosphere which formed a part of the legitimate stage setting should also be used in constructing the modern form of entertainment peculiar to the presentation of motion pictures.

This rather indefinite, almost intangible "something," usually referred to as "atmosphere," is provided for the large part by means of effect lighting.

In its general aspects, so-called effect lighting is composed of three very broad divisions, as follows:

1. The projection of animated scenic effects.
2. The projection of color effects.
3. The projection of simple masks, cut-outs and special lantern slides.

The last two of the above-named divisions are of comparatively recent origin, at least as regards the particular manner in which they are applied to the presentation of motion pictures.

Animated scenic effects, however, were used on the legitimate stage a score or more years ago, and they have been retained, with practically no changes, until the present time.

Animated Scenic Effects

In general, scenic effects are imaged upon a suitable curtain, drop, or scrim by the simple expedient of placing a revolving transparent disc, on which the particular effect is painted, printed, or photographed, before a projection lens, much in the same fashion that a slide is projected by a stereopticon lantern. Indeed, many of the commonly used effects are nothing more than special, elaborate lantern slides so designed as to repeat themselves continuously upon the screen. The driving power for these effects may be obtained from either a double-spring clock-work motor or an electric motor attached to the metal casing which encloses the revolving disc for



Fig. 1. A typical mica effect disc on which is printed, painted or photographed, the effect scene.

purposes of projection and attachment to the projector.

Mica is used in constructing the discs because it has the advantages of light weight; does not readily break; is suitably transparent; and above all, withstands a high degree of heat. An effect disc of the type just described is shown in Fig. 1. In the case of certain scenic effects, such as clouds and panoramic views of floods and cyclones, which are focussed in a fairly sharp manner upon the screen, the parts of the effect consist of simply the effect disc, the protective casing and the actuating, adjustable speed, clock-work motor.

Other effects, such as flames, ocean waves, babbling brook, etc., use the same parts in their construction with the addition of a 5-in. diameter glass ripple plate inserted just in front of the projected portion of the disc, so that the projection lens sees the disc through the rippled glass. The plate serves to give an irregular fused-motion effect to the local areas on the disc which would otherwise move across the screen in sharply defined rigid fashion. The component parts of an effect unit are shown in Fig. 2. Some effects, as, for instance, rain and snow, make use of either a special disc, or a special plate placed before the disc in such a position that both elements are projected at the same time.

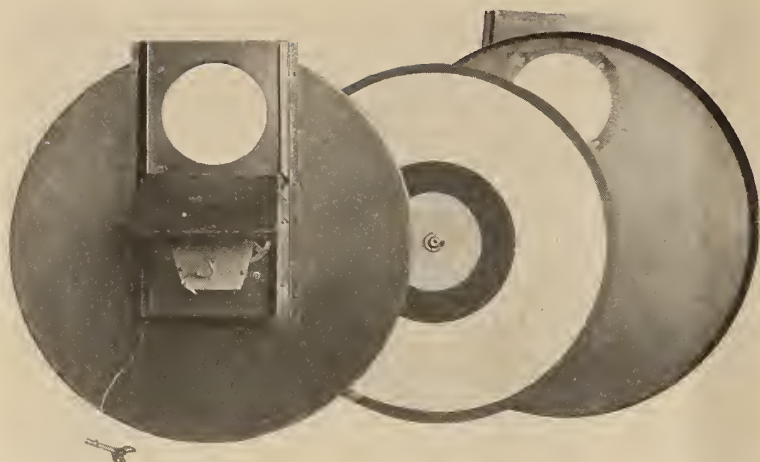


Fig. 2. Component parts of a disc-type effect unit.

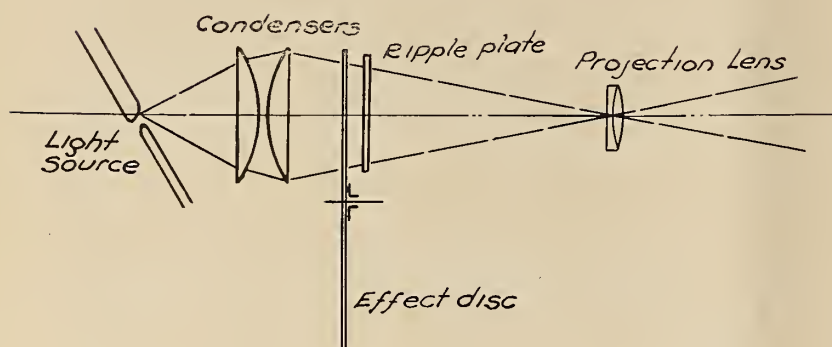


Fig. 3. Optic system used for projecting revolving disc effects.

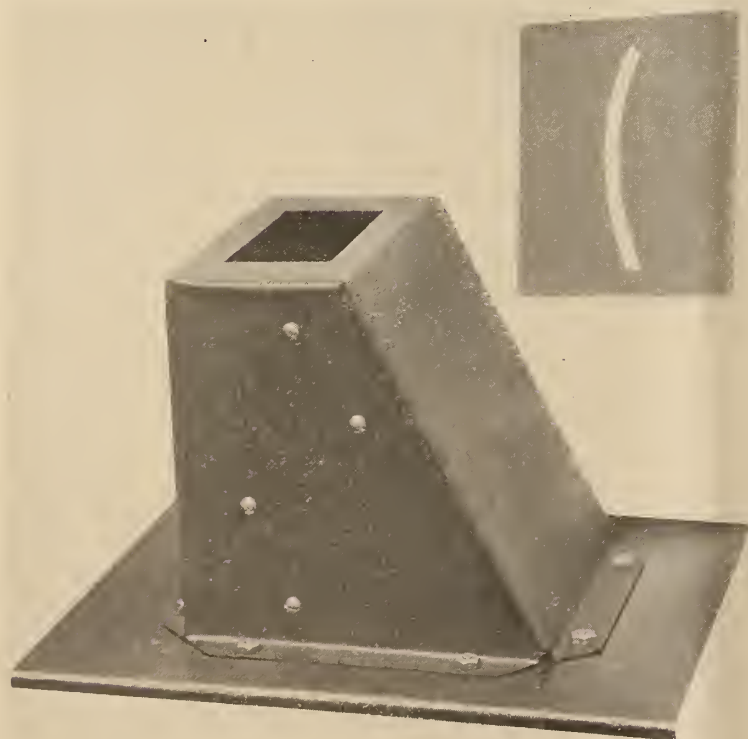


Fig. 4. Prism box and metal slide for producing natural colored rainbow effect.

In the case of rain the standard 18 in.—mica disc is used, the entire disc being opaque with the exception of the rain drops which are represented by elongated clear portions of mica for passing the light.

A rain plate, consisting of two separate plates of either glass or mica, on which have been printed closely spaced opaque lines, the plates then being placed together and rotated at a slight angle to form a zig-zag pattern, is then placed in front of the rain disc to break up the drops and give the effect of a shower.

A special disc is used in the case of snow, this being of a firm, opaque material in which have been punched many small holes (representing the snow flakes) closely spaced to simulate either a heavy or light snowfall, as desired.

Each effect disc is provided with a holding plate, the edges of which are turned over to form a lip so that the effect casing can be slid into a suitable holding plate on the projector in the same fashion that a colored gelatine is placed in position in front of a spotlight.

These holding plates on the effect casing are not rigidly fastened but can be swiveled completely around to permit of the effect casing being rotated when in position before the projector condenser lenses. In this manner the effect, as shown upon the screen, can be made to sweep across it in any desired direction.

The method of projecting upon the screen such standard effects as described above is briefly shown in Fig. 3, where it will be seen that the optic system used is that of the well known stereopticon form.

Some effects require two elements, one of which consists of a suitable lantern slide or a metal stencil-mask placed in the slide carrier of the projector. Of such a type is the waving flag effect wherein a lantern slide of a flag is projected to the screen through the slots of a spoked wheel which revolves at a point between the projection lens and slide. The wave motion is imparted to the flag by the shadows of the wheel spokes sweeping across the projected image on the screen.

Other examples of two-element effects are the rainbow, aurora-borealis and lightning effects. The first named, see Fig. 4, uses a stencil of a rainbow cut in a metal mask which is then placed in the slide-carrier for imaging on the screen, and in front of the projection lens, Fig. 5, is placed a prism box containing two optical prisms for imparting the necessary rainbow colors to the image on the screen.

Some effects are quite complicated as to structures, a good illustration being the moonlight water ripple (a two-element effect using a ripple-box and a metal box) shown in Fig. 6. Three ripple plates are used in this device, each plate consisting of an opaque field across which fine water ripple lines weave so as to overlap and form a network.

These three plates are then caused to move up and down by means of a clock-work motor, being thrown out of step (120°) with each other by means of three eccentric hubs on the motor shaft; each ripple plate being joined to its respective hub through a driving arm.

Scenic lantern slides, in combination with an effect for imparting motion to certain areas contained in the picture, are also commonly used. Thus, in a slide of a camp-fire group, a flame effect can be used to show a realistic camp-fire with the flames leaping from the logs; or a mountain waterfall can be shown with the water tumbling over the brink of the fall to the bottom; or still further, the water in the pool at the base of the fall can be made to swirl about.

Indeed, by means of animated effects, volcanoes can be set into action; the fury of the elements invoked; and scenes can skip quickly from arctic to tropics, from summer to winter—while the patrons sit high and dry, in comfortable seats, with their galoshes and umbrellas safely parked in the vestibule at home.

Color Effects

Color effects, as projected from a special "spot booth" or from the projection room proper, are used in prologue work, special numbers, organ solos and even in the showing of motion pictures.

The principal control, in the case of simple colored lighting effects, consists in changing the colors themselves, or in changing the shape of the projected floods or spots.

Thus, a round, square, rectangular, or any odd-shaped colored spot or flood may be projected singly or in combination with one or more spots or floods of special shape to obtain a blending or dissolving color action on the stage.

When the standard double-optic system type of effect projector is used, two different colored beams, of any desired shape, as, for instance, square, may be dissolved back and forth to obtain colors other than those represented by the gelatines used in the projectors. Or a square flood may be placed around the organ and the organist "head-spotted" with either a clear or colored round "spot." Combinations in this respect are quite numerous.

A very pretty effect, and one which is often used in title and border work while motion pictures are being shown, is found in the use of special glass design plates which are sharply imaged on the screen (or around the picture area) after which a special color wheel, consisting of narrow widths of various colored gelatines, is placed in front of the projection lens so that the colors, as they pass before the lens, are caused to weave across the imaged design on the screen; a peculiar blending and fading in-and-out effect being obtained.

The effect apparatus required to accomplish this is shown in Fig. 7.

As used in connection with film title work, this color effect serves as a prelude to the principal title and is operated in the following manner. A blank leader, of a length consistent with the period of time it is desired to show the colored effect, is spliced between the last reel of one subject and the first reel of the next succeeding subject so as to make a complete 2,000-ft. reel.

The projectionist, taking a cue from the end of the last reel as it passes through the projector, is stationed at the effect projector and when

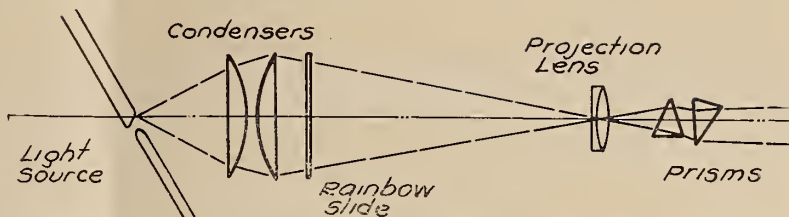


Fig. 5. Optic system for projecting rainbow effect.

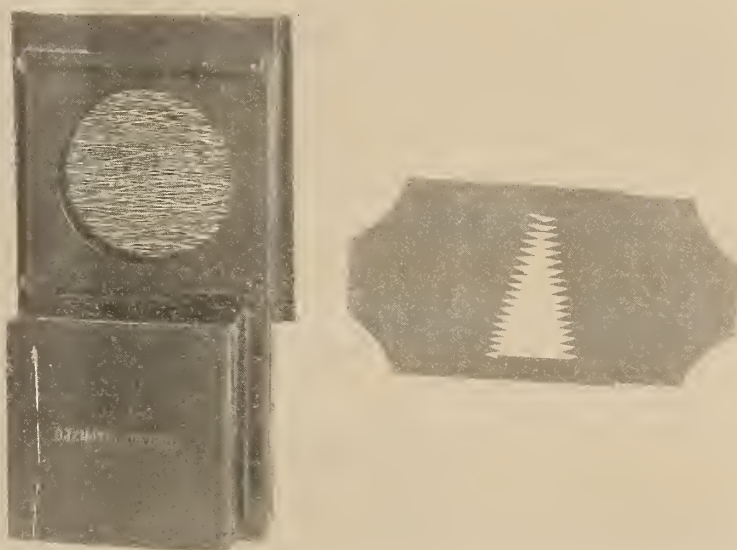


Fig. 6. Moonlight water-ripple box effect and metal ripple mask.

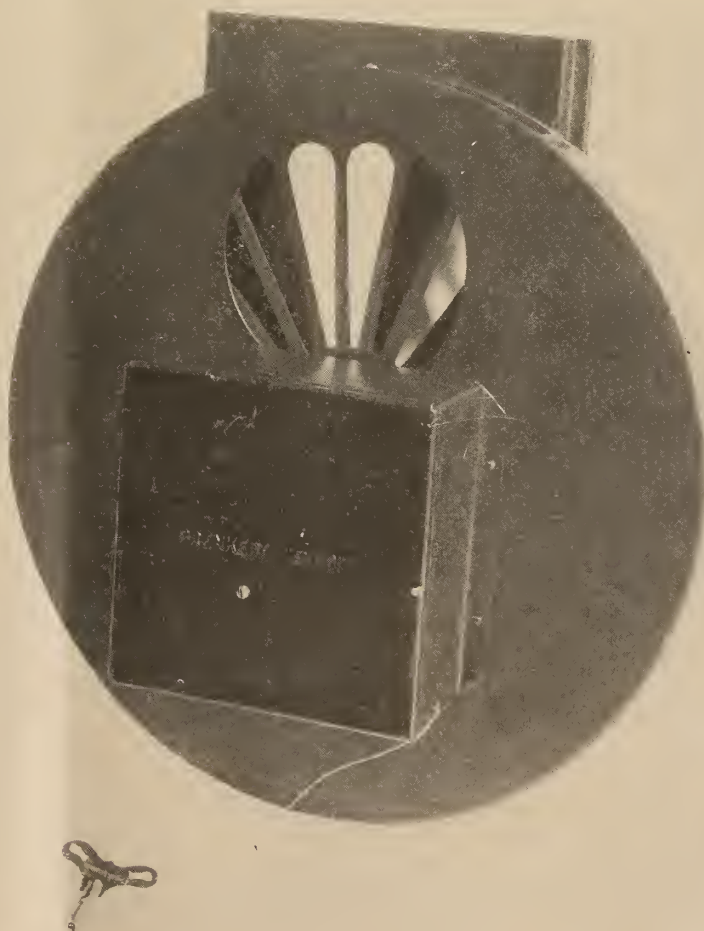


Fig. 7. Color wheel and glass design plates for blending colors effect.



Fig. 7a. Effect plates.

the cue is received he gradually opens a pair of vertical framing shutters which causes the blending color effect to be seen on the otherwise dark screen, as if appearing from behind a pair of slowly opening draw curtains.

This effect is allowed to stand on the picture screen while the blank leader is being run through the projector and even after the title is projected onto the screen, the colored effect then serving as an animated field. Just before the picture comes on, the projectionist slowly closes the framing shutters, thus making the effect apparently disappear behind the closing curtains, leaving the motion pictures to follow closely on its heels.

By means of a special mask, provided for the purpose, the same effect can be projected around the border of the motion picture and left there until that particular subject is finished; or else a new design may be dissolved upon it to take its place, thus constantly changing the effect obtained.

Masks, Cut-Outs, and Special Slides

By far, the greatest number of original effects are obtained by the use of simple masks, stencils and, in special instances, lantern slides.

Stencils of flowers, ships, hearts, vases, crosses, and many other objects are legitimate prey for such effects and are eagerly seized upon by projectionists in their quest for the novel and original. One man in St. Louis has made a stencil of every conceivable kind of flower, including a few that possibly never grew; another in Englewood, N. J., has a penchant for ships and on the slightest provocation will project a figure of a vessel of some kind upon the titles of all marine films.

Coming still closer to home, one of our own projectionist-members, will, without warning to anyone, sit down and make a pair of lantern slides consisting of a positive and a negative of some odd design and then dissolve them in colors back and forth upon the screen.

This work is unique and never becomes tiresome except for the physical exertion required, since an illustrative point in the current feature picture can be made to serve as the subject.

Some simple forms of stencils, a positive and a negative lantern slide, and a special mask, used in obtaining such effects, are shown in Fig. 8. Feature pictures, prologues, skits and special acts may serve as the inspiration for projecting novel and original effects.

EFFECT PROJECTORS

The Spotlamp Effect Projector

In its simplest form an effect projector is nothing more than a spotlamp to which have been added an extra condensing lens for converging the light to make it pass through an effect (attached to lens holder plate) and then on to a projection lens (attached, in turn, to the effect casing).

The complete assembly appears as in Fig. 9. A special effect holder for projecting two - element effects with such an outfit is shown in Fig. 10.

This simple device was designed primarily for use "back-stage" where it is particularly effective in that it can readily cover a large area on a short projection distance; can be easily moved about; occupies little space, and can be stripped of its accessories and impressed into spotlamp duty when required.



Fig. 8. Some typical masks, cut-outs and special lantern slides.

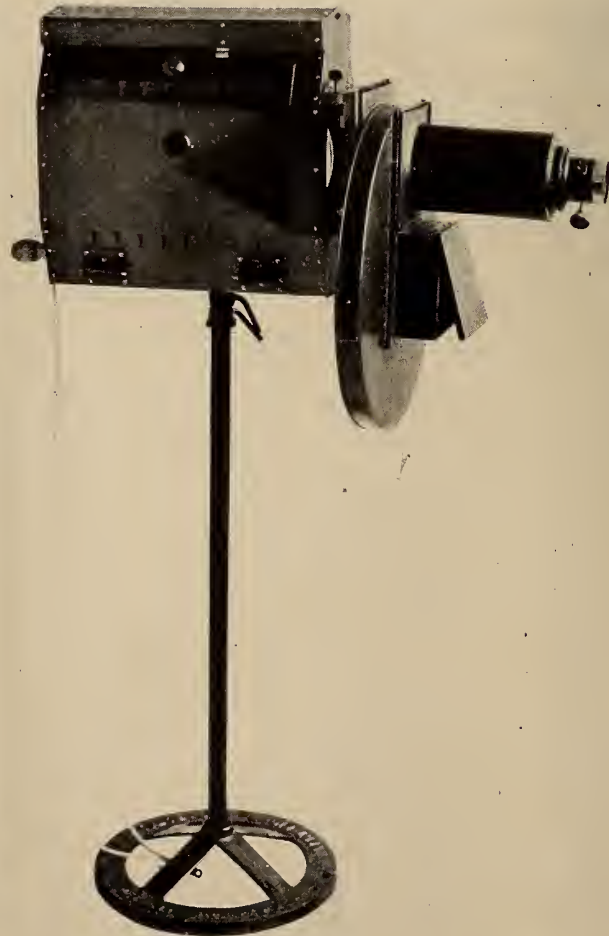


Fig. 9. Assembly view of spotlamp effect projector.

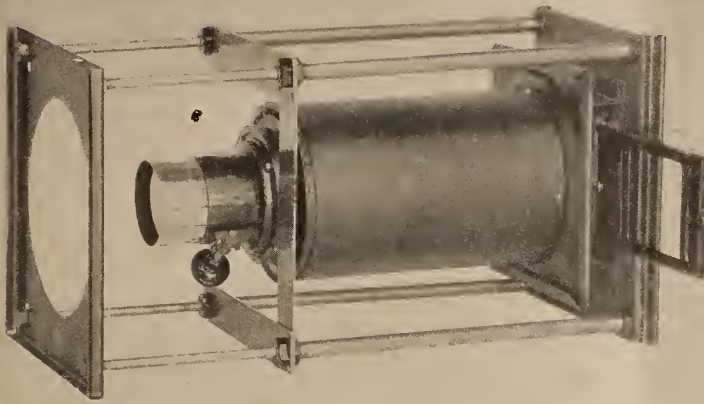


Fig. 10. A special effect holder for use with two element effects.

Its adaptability to short focal length lenses for covering large areas at limited distances really acts as a powerful deterrent to its use in the projection room where, because of the greatly increased projection distance, long focal length lenses are required. There are no ordinary means for rigidly supporting such lenses on this unit and, indeed, even if there were, the device would be quite cumbersome and difficult to handle with ease and rapidity.

Modern practice in motion picture theaters only served to accentuate the inconveniences of such limitations and it was early realized that for this service a special unit, particularly designed to meet the conditions in picture theaters was essential for proper effect projection.

It is true that efforts were made, and for that matter still are being made, to apply the spotlamp effect projector to projection room operation that a single demonstration, wherein rain drops appear of balloon proportions and snowflakes take on the appearance of a bombardment by snowballs, serves to convince the economical aspirant of the futility of his efforts.

The spotlamp type of effect projector, therefore, is very definitely limited to back-stage service.

The Standard Double Effect Projector

The peculiar nature of the motion picture program—peculiar, that is, only in that it differs greatly from the heretofore accepted form of popular entertainment—revealed the need for a projection device especially adapted to producing those lighting effects which seem to find ever-increasing favor among theater patrons.

It was only natural, therefore, that such a device, as illustrated in Fig. 11, should find a place in projection rooms. This is the now accepted standard double effect projector which first made its appearance some 4 or 5 years ago.

The advantages it holds over the spotlamp type of effect projector are as listed below:

1. Higher operating efficiency;
2. Produces effects which can be obtained by no other means;
3. Projects dissolving lantern slides;
4. Greater flexibility in operating;
5. Requires but one attendant for multiple effects;
6. Easy to operate.

Aside from these, there are certain advantages which result from its placement in the projection

room since in this location it comes under the supervision of the projectionist who is, or at least should be, more skilled in handling such projection devices, than are other employees about the theater.

Furthermore, the centralization of such projection devices in the main projection room places the responsibility for their successful operation in one person's hands instead of distributing it among various persons about the theater. This naturally assists the systematic departmentization of the theater so necessary to its efficient operation.

In its simplest form, the double effect projector is nothing more than a dissolving stereopticon to which have been added, see Fig. 11, horizontal and vertical framing shutters, iris shutters, dowsers shutters, a hinged slide carrier for swinging out of the way, effect holders, mask holders, extra projection lenses, a means for quickly altering vertically the direction of both light beams, and a means for quickly tilting or swiveling the entire projection mechanism so as to cover any desired portion of the "front of the house."

It can also be used in an emergency, although lacking in intensity, to project "spots" or floods of special odd shapes by simply placing a suitable cutout in the slide carrier, or by manipulating the iris.

As an effect projector, it can produce either single or double effects by placing a revolving disc effect unit in one, or both, of the holders attached in front of the condenser lenses.

The upper system in Fig. 11 shows the method of supporting such effects in place.

Blending or dissolving colors, projected to any portion of the front of the house, are obtained by placing

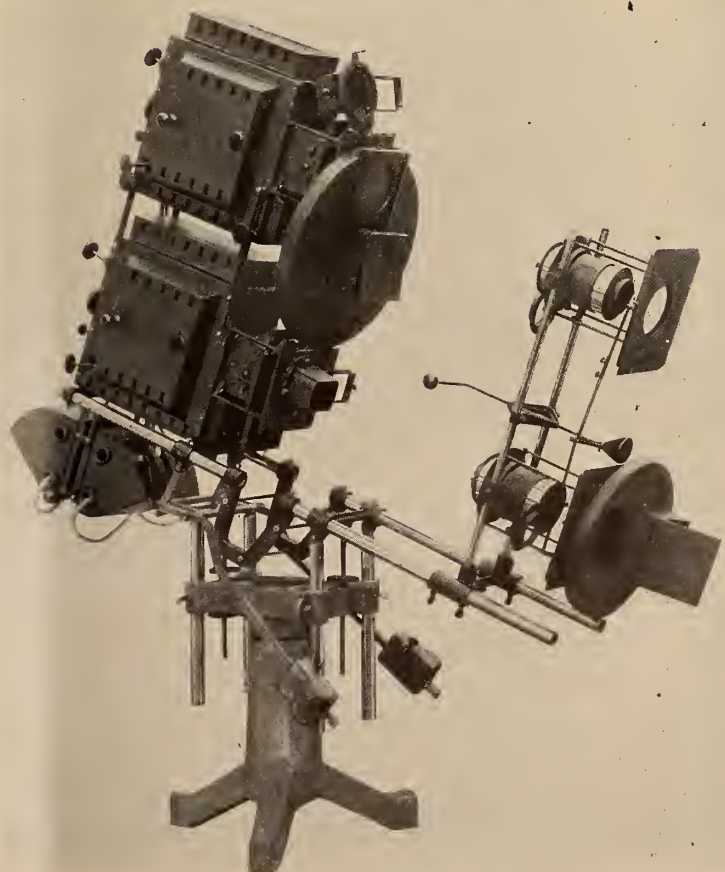


Fig. 11. The standard double-effect projector.

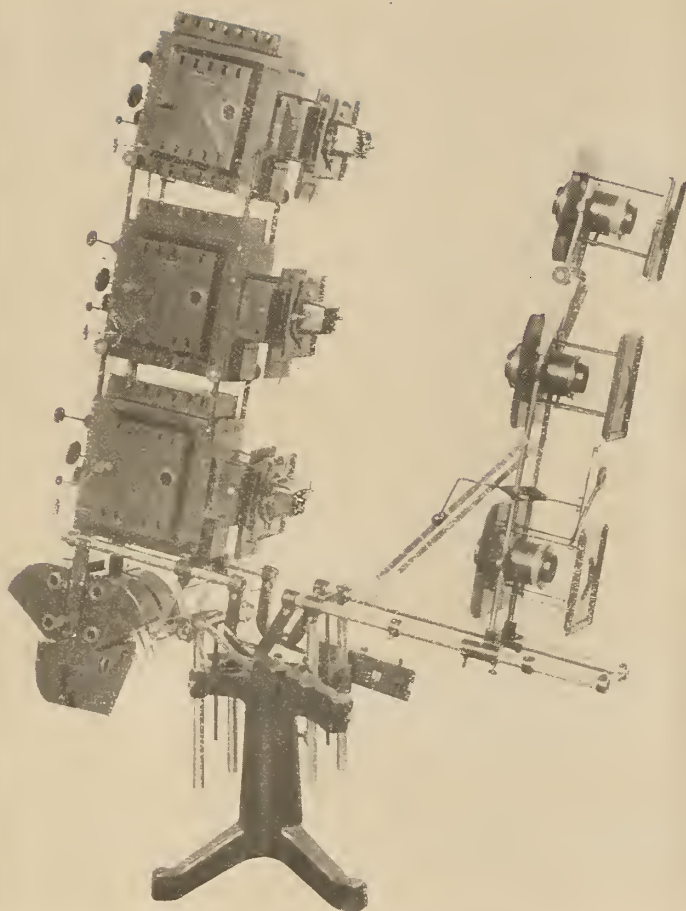


Fig. 12. A special triple-effect projector.

a suitable color wheel in the front effect holder, as illustrated by lower system in Fig. 11. Glass design slides, cut-outs, or ordinary lantern slides are placed in the standard slide carriers, located in the usual position, before the condenser lenses.

The framing shutters, iris shutters, and special mask holders, are attached, in complete assembly, to the front of the lamphouse in such a manner as to be between the condensing lenses and the standard slide-carrier.

Control over the area covered by the effects—whether projected on the motion picture screen or over the entire stage opening—is obtained by means of two projection lenses in each system. These lenses, one of which is of short focal length and the other of long focal length, are mounted at opposite ends of a lens barrel, see Fig. 11, and are pivoted to permit each being quickly swung out of the way so that a rapid selection of lens is possible.

The short focal length lens is for projecting effects over the entire stage opening, any desired reductions in size being obtained by means of the various shutters provided, or by using a special mask. The long focal length lens, nearest the screen, is more commonly referred to as the stereopticon lens since it is chosen with a view to projecting a picture of the same size as that formed by the motion picture projector.

The picture size can be varied, of course, by substituting lenses of any required focal length, which operation requires but several minutes.

This projector is equipped with either arc lamps or high wattage projection type incandescent lamps, whichever may be desired. The

latter are satisfactory on projection distances up to about 100 ft.

Triple-Effect Projectors

In the same manner that a spotlight is limited to the showing of single effects so, also, is the double-effect projector limited to the simultaneous projection of two effects. There are occasions where the restrictions of the double machine are keenly felt, as, for instance, where it is desired to show dissolving slides along with a general animated effect.

Then, too, there are certain effects, such as a volcanic eruption, where nothing but a triple-optic system device can be used. Such occasions, to be sure, are not as numerous as where double effects are desired; nevertheless there are times when the lack of these facilities is a drawback.

The triple projector is shown in Fig. 12. It is operated in the same fashion as the double type.

H-I Arc Single-Effect Projector

The constantly increasing size of new motion picture theaters is making strenuous demands upon all types of projection equipment; not alone as regards spotlamps and effect projectors, but also upon motion picture projectors. A brighter source of light, the high intensity arc, has for some time past, been used for motion picture projection, but it was only recently that the same source was applied to the projection of lighting effects.

Being an entirely new piece of projection apparatus, the potentialities of this high intensity effect projector, Fig. 13, have not, as yet, been fully uncovered, and its principal use, therefore, has been confined to producing colored floods, spots and odd-shaped illuminated designs.

In addition to being able to project single animated effects, color effects, and cut-outs, slides and the like, it appears to have unlimited possibilities in the way of special effects of a type heretofore impossible of attainment due

(Continued on page 32)

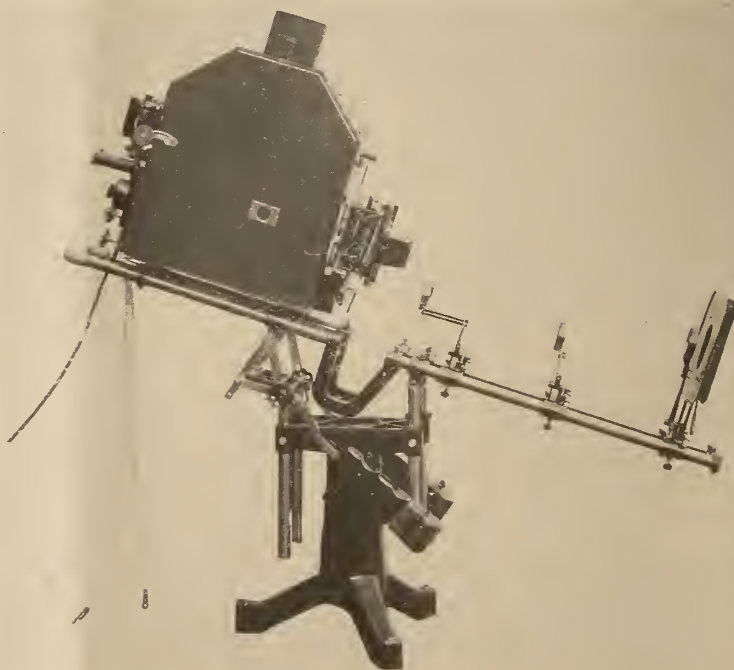


Fig. 13. The high intensity arc single-effect projector.

How to True Commutators

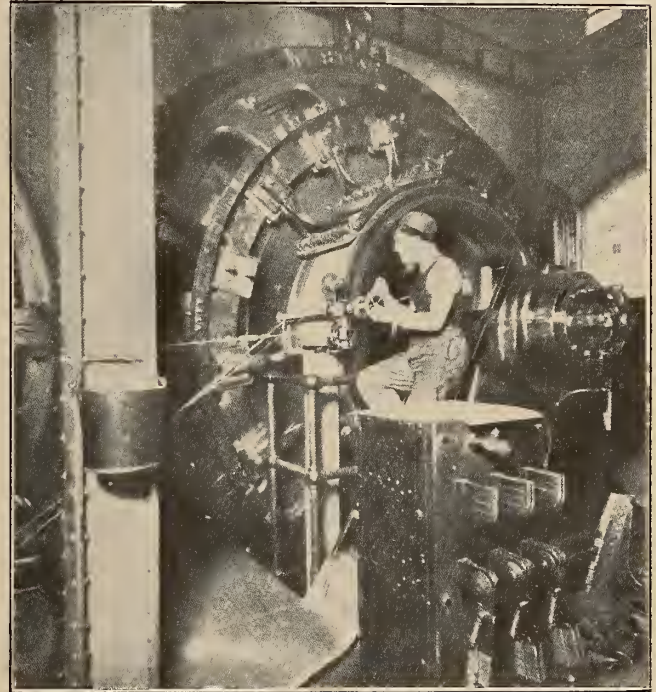
By CHARLES H. BAYER

THE device for truing commutators consists of a grinding wheel in ball bearings, equipped with appropriate clamps whereby it can be fastened to the rocker arm or motor frame. It operates as follows:

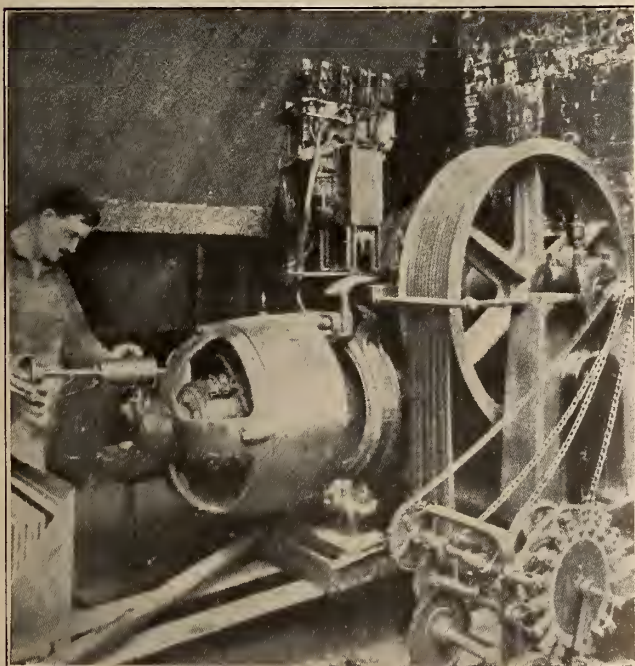
The truing device is fastened in position so that its shaft is parallel to the generator or motor shaft and the grinding wheel just clears the commutator. A round belt passes around a driving pulley on the grinding wheel shaft, and from there to a grooved pulley on a 1 H.P. motor. The grinding wheel is movable parallel to the commutator, and has sufficient range so that it can be fed across the entire length of the commutator face. The shaft of the device is set in an eccentric barrel, and, by the manipulation of the handle for revolving the eccentric barrel feed, the wheel can be approached nearer the center of the commutator, thereby permitting as light a cut as may be desired.

The machine is set in motion by placing the belt in position. The grinding shaft is then lowered by the eccentric sleeve to take off the proper cut, and the grinding wheel slowly fed across the commutator by the hand wheel. It will be apparent from examination of Figure 1 that the commutator is trued with relation to the true center of rotation, which may or may not correspond with the centering marks in the ends of the shaft. In this respect, the device does a truer job than if the commutator were trued to a lathe, leaving the copper and mica even.

The wheel used in this device is of special composition and contains no emery or other mineral matter which might injure the insulation between commutator segments. The cut made by the wheel is peculiarly clean and



Commutator of 3,000 K.W. Railway Rotary of Interborough Rapid Transit Co. (N. Y.) being trued from d.c. side of system with machine running at normal speed.



Elevator motor commutator being trued with truing device without disconnecting coupling from worn shaft, with current on motor and car running total length of shaft without stop.

satisfactory, there being no tendency to drag the copper across from segment to segment. When the job is done, every segment will show the full width of the mica between bars. It is generally known that it is very difficult to do a good job where a commutator is insulated with hard mica, because of the action of the mica on the tool, no known toolpoint being able to resist it. The commutator truing device grinds down both copper and mica alike to the same height, and the commutator is as true when the work is completed as if it were turned in a lathe out of one piece of metal.

The device is thoroughly well-made; the shaft revolves on a bushing on which are fastened ball bearings, effecting minimum friction and wear. All its parts are standard and interchangeable.

A word more as to the wheel, since so much depends on it: As has already been said, it is of special composition and contains no mineral matter to injure insulation, and is adaptable for cutting copper. It is the result of years of experience and experimentation.

It is interesting to compare the three known ways of truing commutators: (1) in a lathe, (2) with a portable slide rest, or (3) in the modern way with a truing device.

Truing in a Lathe

Truing in a lathe necessitates the shutting down of the motor or generator. How inconvenient this procedure may be, how much loss of time and money it may involve is dependent entirely upon conditions. But this much is

(Continued on page 33)

As *The* EDITOR Sees IT

O ¶ *Worn Out Parts—Danger!*

ONE of the very great dangers in the projection room is the continued use of worn-out parts on the projectors. It is necessary to take into consideration not only the damage to film (amounting annually to hundreds of thousands of dollars) but also the great danger to the audience. The projectionist must consider himself today not only the central cog of the show but also the guardian of the lives of his audience who have taken his competence and his sense of responsibility as a matter of fact. There is no excuse whatsoever for faulty parts remaining in use after the projectionist has discovered them. The theatre owner himself would probably be the first to order new parts as soon as it had been brought to his attention—as he must realize that worn-out parts tend to give an imperfect picture with the consequent dissatisfaction of his patrons. Furthermore, he is not insensible to the danger involved, and on that score alone would be compelled to replace them. These three things the projectionist must fix firmly in his mind as stemming directly from the negligent use of worn-out parts: first, damage to the film; second, an imperfect show, and third, the great danger to the audience. Not one of them but should give the conscientious projectionist serious thought.

The Hays organization has a department devoted to the care of film in the exchanges. This department is presided over by a very competent gentleman, Mr. Dickinson, and it is he who is authority for the story that follows: Out in the Middle West somewhere (names of theatres were not given to me) exchanges were reporting a succession of damaged film that kept coming back to them from the same group of theatres. The reported damage was mounting into huge figures, as new films had to be ordered to replace the injured. The Hays department sent an investigator into the area, and after a very careful survey reported that the damage to film was wholly to worn-out projector parts in that particular group of theatres. Whether they requested the exhibitors to put new parts in and were turned down is not known, but the Hays organization bought these parts in large quantities and sent them to these theatres free. The film damage stopped at once.

In justice to the great mass of union projectionists it is only fair to say that they are all eminently aware of the requirements of their profession that they guard their audiences with alertness and with a full sense of their responsibility to it. Some day we hope to get the report of that investigator from the Hays office, but we are sure that the houses reported would be found to be predominantly manned by non-union men. Similar cases came up in the East from time to time and the records show that these houses are almost always non-union.

A case in point is the situation today in Baltimore where the members of the union, Local 181, are locked out of the

theatres because of differences with the theatre owners. A strike-breaking agency, hired by the theatre owners' organization, has imported non-union men, and the people of Baltimore—that is, those of them who are still going to see pictures while this battle is on—have already been subjected to the great danger of several fires in projection rooms now being manned by non-union men. Public opinion in Baltimore now seems to be swinging toward the union—realization that only with recognized, responsible men in the projection rooms will they feel safe for themselves and their children. This feeling is general all over the country.

Our readers will remember that in a recent issue we printed the story of the campaign recently conducted by Kansas City Local 170 in the newspapers of that city in which they stressed the dependability of the union projectionist, his sense of responsibility toward his patrons and the absolute confidence which the theatre-going people of Kansas City might place in him as a factor for the greatest safety. This was a very constructive and progressive move and this publication would like to see other Locals follow this excellent example.

It follows, then, that no union projectionist will allow parts to remain in his machine after their period of efficient service is over, which means, also, after they have passed the margin of safety. Yet this is a timely reminder for us all.

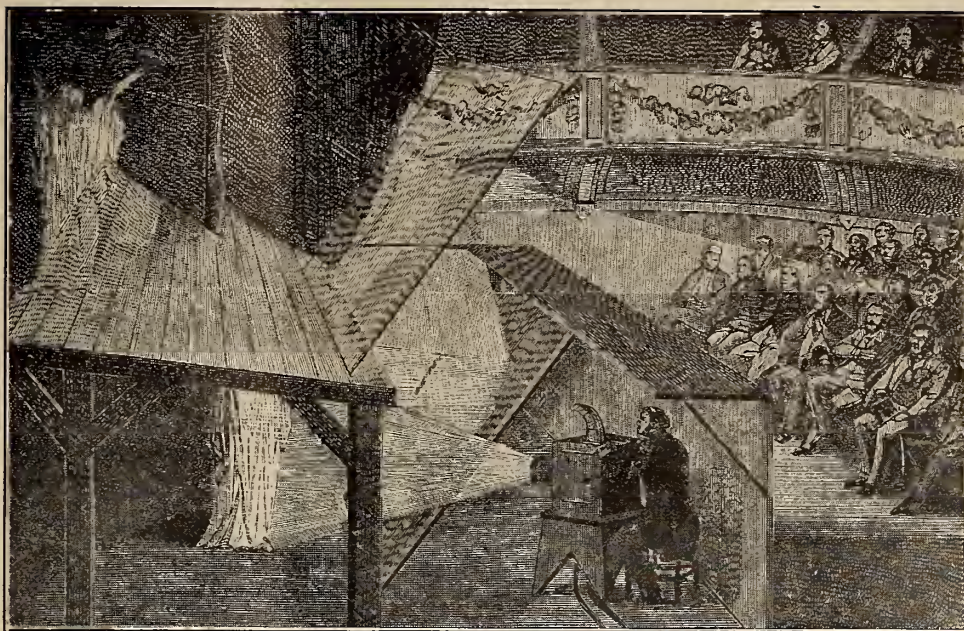
F ¶ *Your Preference—Please*

FROM a publisher's standpoint we have nothing to complain about. If hundreds of subscriptions satisfy us, then we must say that Projectionists are a most articulate group. They speak daily by the scores in this fashion, and their speech to us is sweet music. But we have often wondered just what are the subjects that our readers would want to see discussed in these pages. Many of them have written to us in the most fulsome praise of this magazine and of our editorial judgment. We have many subjects lined up for future issues, everyone of them a pertinent, live topic of the day in the field of projection and projection equipment. But we would be pleased to give some of them preference over the others if there should be any stated preference for them from our readers. Our readers have only to write in expressing their preference to immediately set us upon the trail of the desired material for publication in an early issue. And where are those questions about projection which are bothering you? Send it into this office and our answer will be forthcoming at once. And now we will sit back preparatory to being swamped by the avalanche of letters that will descend upon us from our readers!

Men of Destiny

By JAMES J. FINN

Copyright
1928



London Ghost Show

PROBABLY the first attempt to purvey motion pictures was made in 1632, according to an advertisement that appeared in that year in the London (England) *Post*. There was on exhibition at this time in one of the numerous coffee houses in London a machine that essayed the reproduction of living action, described in the advertisement as "moving pictures."

After that many efforts were made to give the same effect either photographically or mechanically. Moving pictures were foreseen far back in history; as early as 65 B. C. the Roman poet, Lucretius, prophesied, "that

which would be apparently real but only visionary."

No one man invented motion pictures. The motion picture of today represents the cumulative efforts of many men, many minds, many hands. Some played a more important part in the development of the science than others, and all these workers deserve credit proportionately, yet the work of no individual was of such nature as to justify the bestowal on him of the title "Inventor of the Motion Picture." The use of this title is based on either a misconception or complete ignorance of the subject.

To the average person the names of Flinton, Plateau, Marey, Melies, Lumiere, Le Roy, Muybridge, Paul, Dickson, Reynaud, Lauste, and many others, mean very little or nothing. Yet the contributions of these men to the motion picture cover practically its entire development. What follows is an attempt to throw a little light on these men and their works.

The London Playlets

Perhaps the first attempt to create moving pictures occurred more than 50 years ago in London, where there was offered the public in "The London Ghost Show" two short playlets: "Pepper's Ghost" and "Little Jim, the Collier's Child." These playlets were very popular. Their manner of presentation was an advance step from the still pic-



Fig. 1. Reynaud's Theatre Optique

ture slide projected by a stereopticon and from earlier mechanical devices. They formed the link connecting still and motion pictures.

The illustration on this page fully explains itself. In this instance the projection by reflection of a moving body gave the illusion of animated pictures.

Reynaud's *Theatre Optique*

The succeeding years saw the production of many contrivances, mostly toys, using the picture bands, but no important development occurred until Reynaud, in 1886-89, produced in Paris, France, his *Theatre Optique* (Fig. 1), a device using in combination a stereopticon and continuous band of pictures showing various attitudes of motion. During those years Reynaud gave many demonstrations of his invention in Paris. The *Theatre Optique* was the first motion picture theatre in the world.

Reynaud was, without a doubt, the first projectionist, director, producer and exhibitor, all in one; in addition, he was a fine artist. He succeeded in producing motion pictures more like those of today than any other pioneer. He employed an unique principle, in that he combined the picture band, or tape, and the stereopticon slide in producing his pictures. The accompanying illustration shows Reynaud operating his machine. The duration of these "motion pictures" was from six to ten minutes.

Dr. E. J. Marey

From 1882 to 1901, Dr. E. J. Marey conducted a series of experiments at the Institute of France, in Paris, bearing on the analysis of motion. He succeeded in making motion pictures from one point of view, using but a single lens. The pictures were viewed by means of a

Cannock's *Edengraph*, widely regarded as the forerunner of the modern Simplex projector.

There are in existence today a number of these pictures showing the fine pioneering work of this inventor.

Friese-Greene

In 1889, Friese-Greene of London, England, succeeded in photographing scenes on a perforated band of photographic paper. To Friese-Greene is often applied the title "Father of the Motion Picture," and his right to the honor is uncontestable. In fact, the United States Court handed down a decision bearing on this very point.

Celluloid Film

Succeeding years saw great progress, but there was no outstanding development until Thomas Blair in England made available a product known there as coated celluloid ribbon. Then the development to celluloid film followed naturally. The most important contributions to this end were made by Lumiere Bros. of Lyons, France; the Carbutt Keystone Dry Plate and Film Co. of Philadelphia, the Rev. Hannibal Goodwin, who is said to be the inventor of celluloid film; George Eastman of Rochester,

and, last but not least, the New Jersey Celluloid Co.

Louis Lumiere

In 1890 in Lyons, France, Louis Lumiere, who was connected with a photographic supply establishment, became deeply interested in both the photographic and mechanical ends of motion pictures. Not lacking financial support, he put up a factory in Lyons and there launched an experimental program which resulted in the completion in 1895 of the Lumiere *Cinematographe* (Fig. 2). (All the early workers in the motion picture field christened their products with high-sounding names.)

The Lumiere machine was used in London and in Paris, and later, on June 26, 1896, at Keith's Union Square Theatre in New York; also at the Eden Musee in the same city. The first picture shown at the Union Square was "The Charge of the Dragoons," made by Lumiere himself. The first man in America to assemble, set-up, and actually run the Lumiere machine at the trial show was Jean A. Le Roy.

Jean A. Le Roy

A few years previous to the appearance of the Lumiere machine there was a concerted effort being made to take pictures out of the peep-boxes, then in vogue, and which permitted only one person at a time to view the film, and put them upon the screen so that a multitude might view them.

Perhaps the first successful effort to realize this was when Jean A. Le Roy, of New York, a photographer and a lantern-slide projectionist, succeeded on February 5, 1894, in making pictures move upon a screen at 16 Beekman Street, New York—the first show of its kind in the world!

The mechanism shown in Figure 3 is the machine that was used to project this show. This projector, known

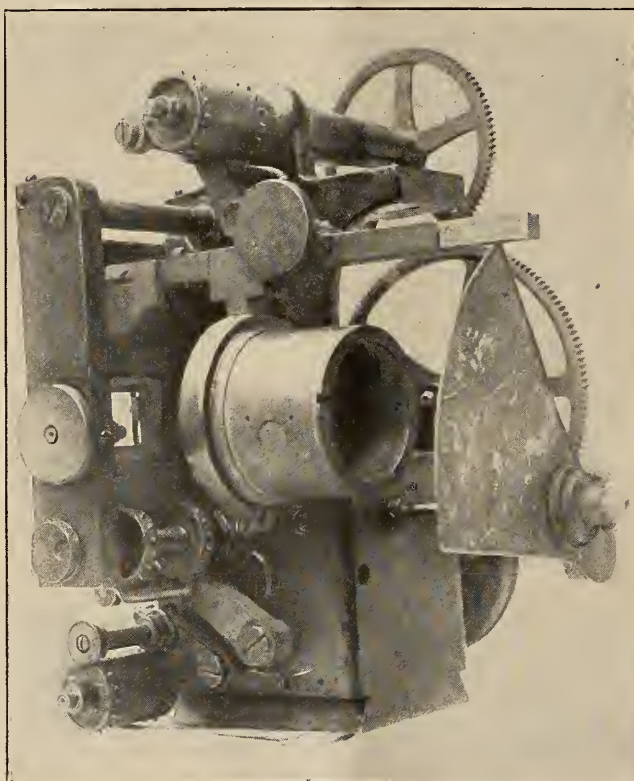
as *Le Roy's Marvellous Cinematographe*, ran peep-box film. It had many elements of the modern projector: a top reel, feed sprocket, a loop in the film, a gate, an aperture, an obscuring shutter, a projection lens, an intermittent mechanism, and a takeup sprocket. Although apparently crude, this machine was in constant use until July 6, 1897.

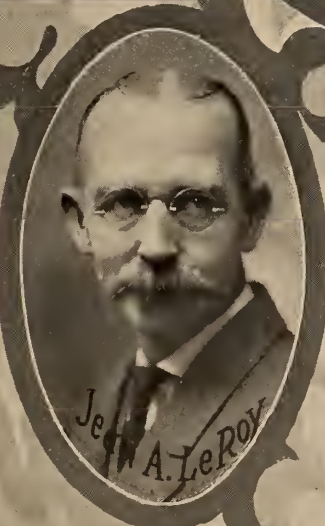
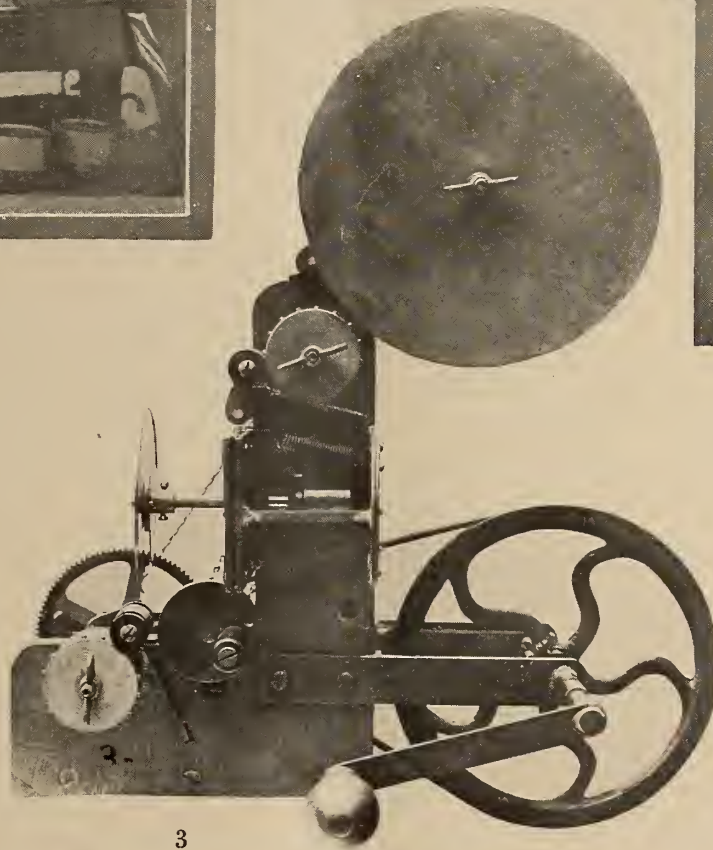
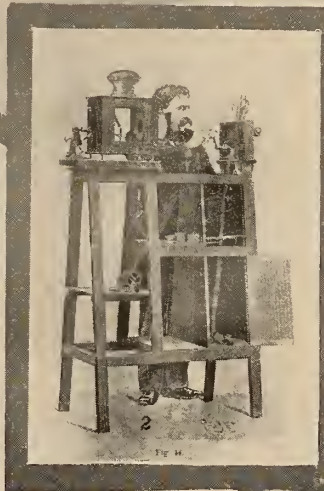
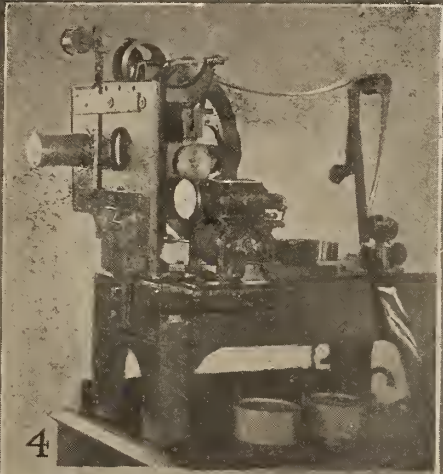
First Picture Roadshow

The first picture roadshow in America played its first stand at the Clinton (N. J.) Opera House on February 22, 1895. The *Le Roy Cinematographe*, operated by Le Roy himself, was used. Business was very poor, because the people didn't believe the claims put forth by the show management. The troupe encountered many difficulties, and the promoter took much abuse. The people, simply refusing to believe that there could be any such thing as was advertised, gave the show little support.

Eugene Lauste

The next important contribution to the art of the motion





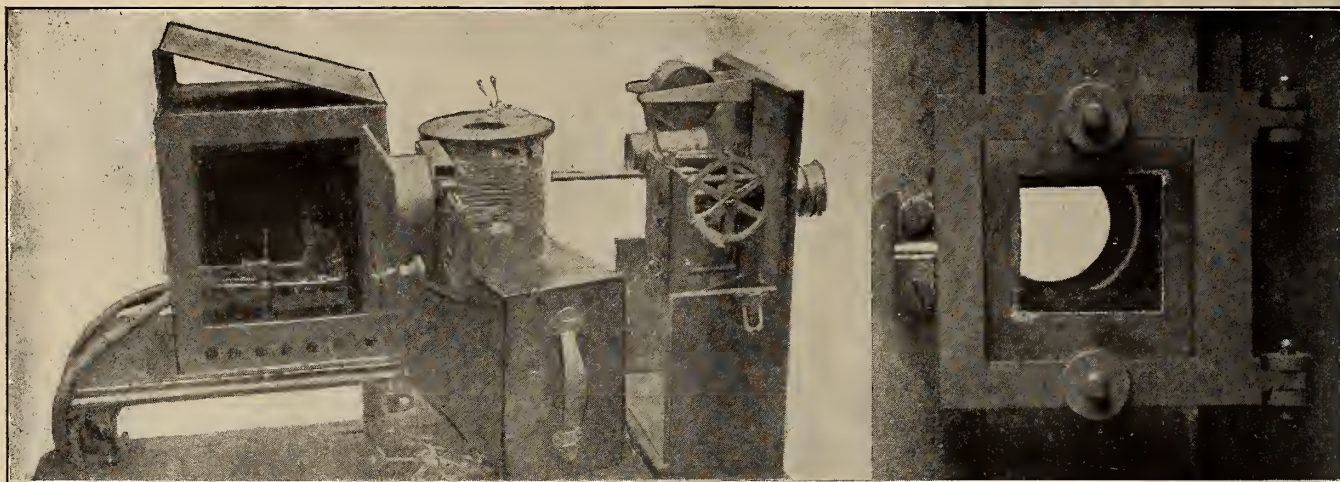


Fig. 8. Issacs "Coffee Grinder"

Fig. 8a. Issacs Attachment

picture was made by Eugene Lauste. Lauste had been with Edison for a number of years when in 1894 he was hired by Woodville Latham to build a projector. Latham was a college professor with an "idea" but having absolutely no mechanical knowledge.

Lauste's projector, on which he did all the work and designed and made all the parts, was finished in April, 1895, and was known as the *Eidoloscope*. On April 21 of the same year it was first demonstrated at 35 Frankfort Street, New York, with Lauste acting as the projectionist.

Although Latham secured patents on the basic principles of the *Eidoloscope*, the feature of which was a loop in the film, it was attacked in the courts and no decision was ever rendered giving him exclusive rights on his invention. Latham and his sons wore them-

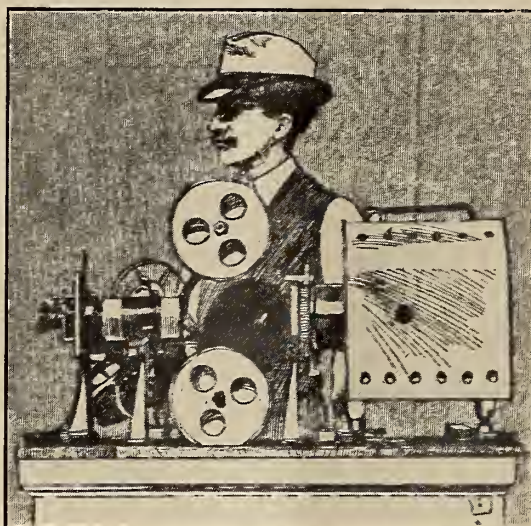


Fig. 12. Dunn's Excellograph

selves out in attempts to hold their rights, but these efforts served only to reduce the family to poverty. Latham died penniless.

Lauste is also credited with having produced the first "talking pictures," when in 1906 he invented, patented, and demonstrated his "talkies," with the sound waves photographed on the film, the same principle as is used today in producing modern "talking pictures."

Charles H. Oxenham

In Figure 6 is shown Charles H. Oxenham, who was very active in 1896 as an inventor, projectionist and exhibitor. He is using the peep-box and ear tubes—the apparatus being the combination of a phonograph and a peep-box. This device is the forerunner of the suitcase motion picture apparatus of today.

The *Kinetoscopticon* (Fig. 4), made by Oxenham in 1896 was probably the first motor-driven machine. It possessed many elements of the modern projector, but it was totally unlike any of its contemporaries. It was a continuous-feed machine.

Improvements continued to be made in the commercial machine, and later, Oxenham bought from Lubin, of Philadelphia, one of the latter's first *Cineographs* (Fig. 7), a continuous-feed machine with a hand drive, an arc light illuminant, and having below the table on which it rested a magazine in which the film folded up in layers.

Walter Issacs

Next came Walter Issacs, an importer and exporter of optical goods, who in 1896 placed on the market a machine popularly known as "The Coffee Grinder" (Fig. 8), because of the clatter it made when operating. A poor copy of the Lumiere *Cinematographe*, Issac's machines were sold as attachments to stereopticons. The Issacs machine enjoyed a tremendous sale, due to the desire of many people at this time to enter the motion picture business, which was regarded as an easy occupation and a short cut to riches.

Two other machines about this time were the Kuhn

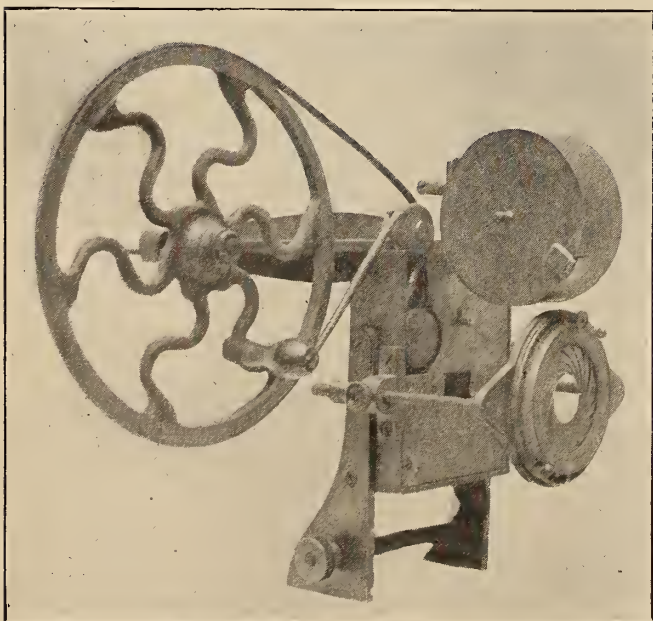


Fig. 11. Riley Bros.' Kineoptiscope

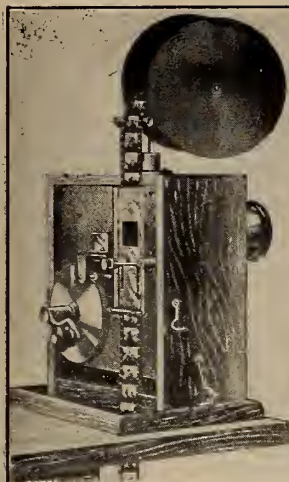


Fig. 9.

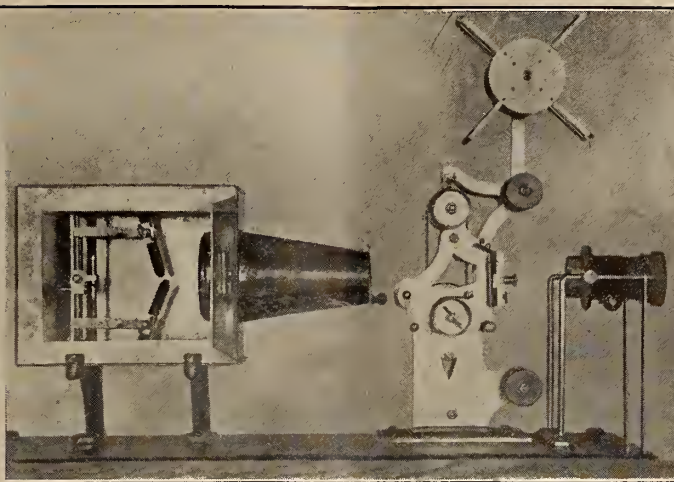


Fig. 10.

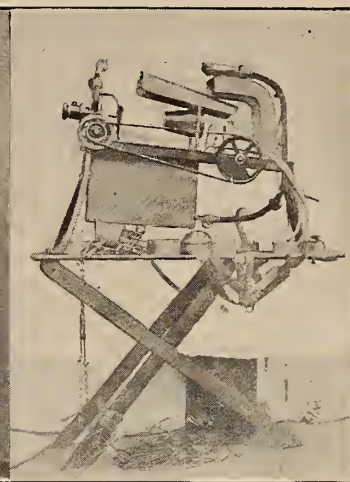


Fig. 7.

Projectograph (Fig. 10), and *Eureka* attachment (Fig. 9).

Issacs also made another form of attachment which is shown in Figure 8a. The features of this machine were a five-pointed star wheel and a one-pin cam. Incidentally, mention might be made of the fact that the five-pointed star and the crank on this machine were the basis of a design made by J. A. Le Roy for the emblem of M.P.M.O. Local 1 of New York in 1912.

Riley Bros.' Kineoptiscope

Next came Riley Bros.' *Kineoptiscope* (Fig. 11), also an attachment, the features of which were a claw motion, a belt drive, a shiftable aperture for framing, a film magazine, and an adjustable lens ring. Developed in Bradford, England, in 1895, the Riley machine was sold in the United States in 1896. It was successful until its sale was stopped by a charge of alleged infringements on patents then in existence.

Colt's Criterioscope

In 1897 there appeared on the market a machine invented and patented by Unger & Krug as early as 1895, and which, after being commercialized in 1897-98, was known as *Colt's Criterioscope* (Fig. 14). This projector was regarded by experts as the best-constructed machine that had appeared up to that time. Its features were a hand-feed arc lamp, an alum water cell, feed and takeup reels, and its ability to give a steady, almost flickerless picture. It was a great advance in the development of the projector.

Elias P. Dunn

Elias P. Dunn, the "Weather Prophet," so-called because of his position as Chief of the U. S. Weather Bureau at New York, marketed his *Excellograph* (Fig. 12), in 1898. Dunn spent four years developing this projector. Shortly after its introduction, 20 of these projectors were in use in the East. A good product, the Dunn machine had a vogue of several years.

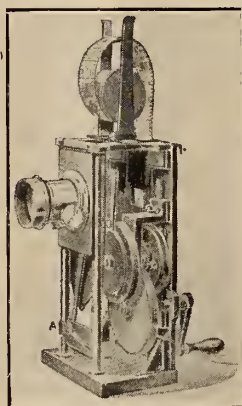


Fig. 13

The Lumiere Commercial

December 28, 1895, is a date of great historical importance, for it marks the day on which Louis Lumiere opened a show with the first model of the world-famous *Cinematographe* (Fig. 2), at the Cafe Boulevard in Paris, France.

The first picture screened by Lumiere on this occasion was "Twelve O'Clock," a collection of views of the employees leaving the Lumiere factory in Lyons. For quite some time the Lumiere *Cinematographe* projected shows at the Cafe Boulevard, which was then recognized as a motion picture theatre. This same machine appeared in New York at the Union Square and at the Eden Musee.

But it was not until 1898 that Lumiere produced his first real commercial projector (Fig. 13). The financial returns on this machine were not even a small fraction of which Lumiere had anticipated, owing to the fact that an American manufacturer pirated practically the entire mechanism, marketed it without permission and claimed it as his own invention. This pirate made many times the amount of money that Lumiere realized.

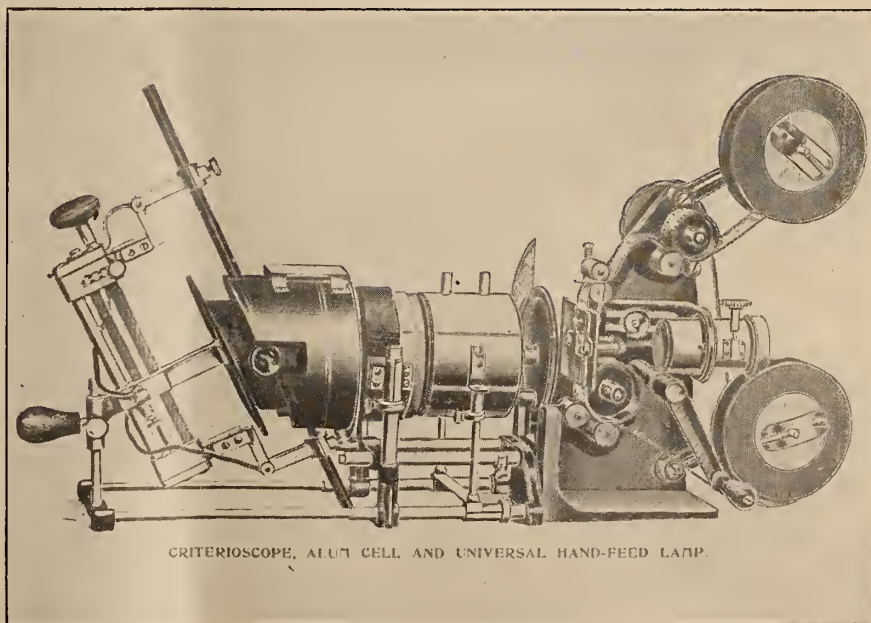
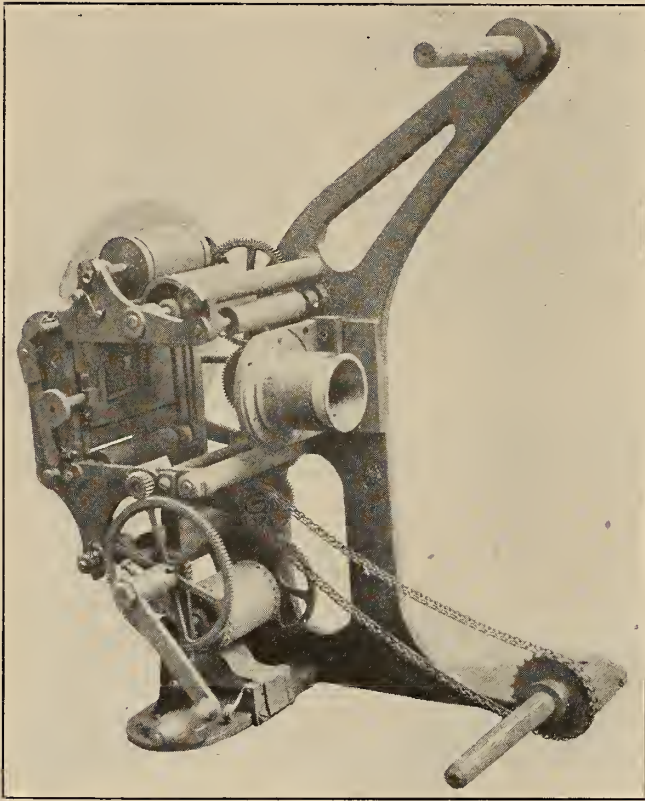


Fig. 14. Colt's Criterioscope

Fig. 15. Rector's *Veriscope*

Enoch J. Rector

Enoch J. Rector, an inventor of distinction, in 1897 brought out his *Veriscope* (Fig. 15), work on which had been started in 1894. The *Veriscope* was used both as a camera and projector: as a camera to photograph the Corbett-Fitzsimmons fight at Carson City, Nevada, on March 17, 1897, and as a projector to show the same pictures in July of the same year at the Academy of Music, New York. Joseph Menschen was the projectionist for these shows. The throw was 150 feet.

Soon after the Academy of Music showings, more than 20 *Veriscopes* were in operation. This projector used a film approximately $2\frac{1}{2}$ inches wide.

Chronik Bros.

In 1899 Chronik Bros. of New York produced a projector (Fig. 16), that had many unusual features, including a feed and takeup sprocket, an adjustable aperture plate, a tension release on the film, a balanced shutter, and, what is perhaps most interesting, a triangular pin-cross with locking cams. This movement is undoubtedly the granddaddy of the modern pin-cross (Fig. 17).

Francis B. Cannock

Francis B. Cannock had worked two years as a mechanical expert for the Vitagraph Co. of America when in 1899 he went to the Eden Musee in New York as chief projectionist. Mike Berkowitz, who in 1897 had worked at the Gaiety Theatre on the Bowery, using there a *Joly Cinematographe*, was Cannock's assistant at the Eden Musee.

While at the Eden Musee, Cannock brought out his famous *Edengraph* projector (Fig. 5). The *Edengraph* is often alluded to as the father of the Simplex projector, which fact is of itself sufficient tribute to Cannock's inventive genius.

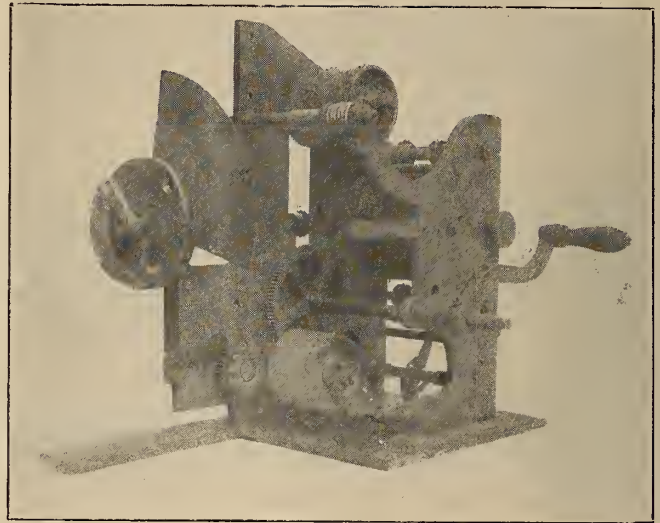


Fig. 16. Chronik Bros.' Projector

Thus unfolds the pageant of names, of achievements, of hopes and fears, of success and disappointment that was the lot of these pioneers. Their road was a hard one, their rewards—financial or otherwise—insignificantly small in comparison to the import of their work. Probably soon an accurate and unbiased history of the development of the motion picture will be written, and then the band of pioneers will be accorded each unto himself a little niche for the recording of their achievements.

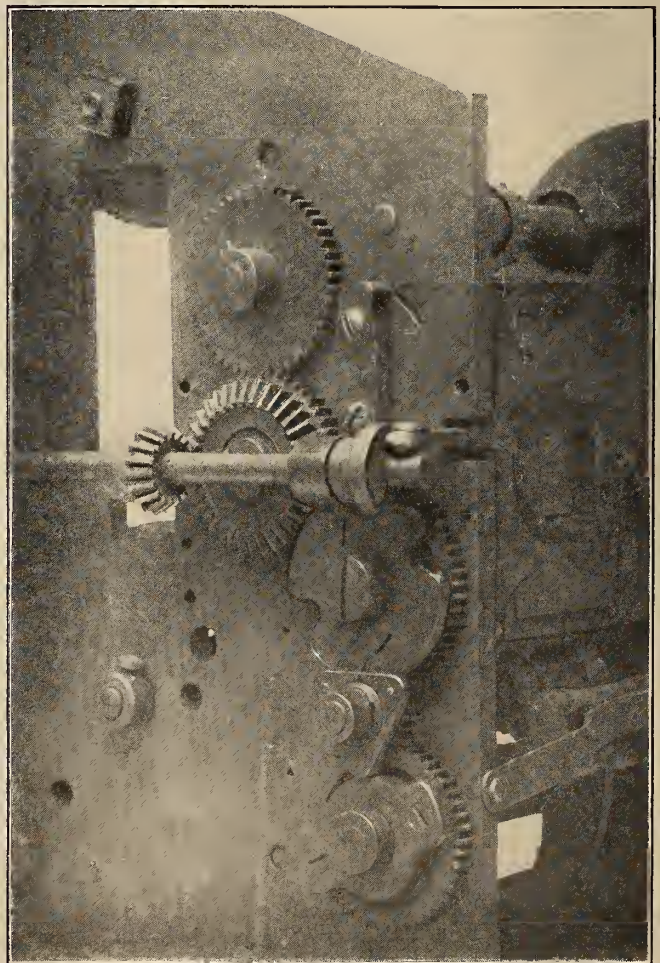


Fig. 17. Pin Cross and Cam on Chronik Projector

1,100 Attend Sam Kaplan Victory Banquet



MORE than 1,100 men and women gathered at the Astor Hotel, in the Grand Ball Room, at midnight, January 28, to pay their respects to a man whom many of them loved personally and whom all admired for his ability, qualities of labor leadership and for the constructive program he has put through in the last two years for his organization—to Sam Kaplan, President of Local 306, New York City.

The event was in celebration of the victory of the Kaplan Administration at the Local election in January when the whole Kaplan official family was re-elected to office—this time for a two year term according to a Local law recently enacted.

Roxy was toastmaster. His wit and humor was at its height when he spoke feelingly of his friendship for the President, and he revealed something of the remarkable power of personality which Kaplan exercises in his dealings with exhibitors and with the industry generally.

The honor guests seated at the dais were Major Zanft of Fox, Major Thompson of Keith, Charles Moskowitz of the Loew organization, Herman Starr of Warners, Charles Levine of Fox, Congressman Celler of New York and Boone Mancall, publisher of the *MOTION PICTURE PROJECTIONIST*. Congressman Celler made a very entertaining speech during the course of which he



Pres. Sam Kaplan of Local 306

mentioned the need for all branches of the industry to work together in order to preserve its present high place in the country's esteem.

Boone Mancall spoke of the place Kaplan held among exhibitors because of his custom of honorable dealing and his insistence of a square deal for everybody. Kaplan has never been known to break a promise he once made—and it is this fact as

much as anything else that has established him in the industry as a figure to be reckoned with.

The President was presented with a beautiful diamond ring as a token of the membership's esteem for him.

The big hit of the evening was the presentation by President Kaplan of gold engraved honorary membership cards to the Local's staunch friends: Charles Moskowitz, Major Zanft, Major Thompson, and Herman Starr. Honorary memberships were also conferred upon J. J. Murdock of the Keith organization and upon Pat Casey, of the Managers Association, who had been invited but who could not come.

As always, Kaplan dominated the evening by his impassioned speech. The President is a seasoned speaker and the pleasure of hearing him talk upon labor problems and Local problems draws hundreds of members to the meetings. On this occasion he reminded the members again of their duties to their craft and to the industry at large and he drew an inviting picture of what the immediate future of the industry had in store for them as master craftsmen. He pointed out that the presence of so many exhibitors was a tribute to their strength and to their importance and said he was proud to count so many theatre owners as friends of the Local—the largest and most progressive in the country.

Wanted: Uniform Cue Sheets

By PAUL AMENT

LATELY I have been greatly interested in making a "fool-proof" cue sheet. This matter of a uniform cue sheet has been sadly in need of some serious work by someone in the craft for not a few years. Uniform cue sheets have been a crying need of our craft for many years, and to this end I have worked out a system for my own use which I find reduces the possibility of error to a minimum.

I have received cue sheets from acts on rehearsal days which look like nothing so much as some bit of paper which has been lying in some gutter for days. Dirty, torn, all scratched up in either ink or pencil—seldom typewritten—and often with gaudy red borders, most cue sheets are worthless. In the matter of sheets with colored borders, or in any color save black on white, I simply refuse to work with such sheets. A projectionist encounters enough eye strain without inviting more by accepting colored cue sheets. Then too, we are all familiar with "Lefts" and "Rights," and numbers like A1, B1, etc.

For a long time now every act that plays my theatre must go over its cue sheet with me. After I understand just what the act wants, I do not use the original cue sheet for my work, but I make my own copies of the cues for every act, one act to a sheet of paper of uniform size. The use of different sizes of paper sheets invites error.

When I have copied each act's cues on a sheet of paper, I have my show in book form, and I am able to work direct from my own sheets without ever being ahead of the act. The chances of error in this system are remote, unless, of course, I myself make an error in copying or the act's cues are incorrect.

The cue sheet first following was given to me printed in blue on a red-bordered card, with emphasis being placed on several lines by writing them in red type:

Act Sheet

SPOT CUES
OPEN WHITE SPOT YOUR LEFT KEEP
SPOT SMALL AND FAVOR WORKER WHEN
MAN IS SWINGING IN TRAPEZE, PLEASE FOLLOW
BY MOVING LAMP AND KEEP SMALL. WHEN STAGE
LIGHTS COME UP DURING MAN'S ROUTINE IN
TRAPEZE, SWITCH SPOT TO GIRL AT YOUR LEFT
AT GIRL'S EXIT SWITCH BACK TO MAN IN
TRAPEZE AND FOLLOW AS BEFORE HOLD
FOR REMAINING TRICKS AND BOWS THANKS.

My Sheet

JOHN DOE & DOE

OPEN—SMALL—W-S-L 2ND ENT. FAVOR WORKER
TILL
CUE—STAGE LIGHTS UP. W-S-L 2ND ENT. ON GIRL
TILL
CUE—GIRL EXITS, W-S-C ON MAN ON TRAPS. FAVOR
WORKER TILL FINISH OF ACT AND BOWS.

The foregoing is comparatively easy considering the following examples from a big band act:

Act Sheet

Open. (Phonograph)
2a. (Radio announcement)
2b. (Two and Four Boys in One)
3a. (Announcement in one)
4a. (Old Fashioned Five)
At Exit:
A.S.R. for Ann'cem't. Then
A.S.C. cover 5. They leave
one by one: *Don't* follow.
Cue: Last man (violinist)

4b. Boy and Girl

5. (Orchestra)

6. (Recitation)

7. (Dance)

8. (Violin and Song)

9. (Band and Dancers)

10. (Pianos and Band)

11. (Finale)

falls asleep and drops violin:
Blind quick.
Blue S.R. 2. (Girl) to Xit.
Hold but change *quickly* to
Amber. Follow girl and cover
2 to Xit. Blind.
Band starts playing: Amber
Flood.
W.S.C. on Leader to Bow.
A.S.R. 3. (Girl) to Xit.
A.S.C. (Head) on man. When
singer joins for 2nd. Solo:
cover both and follow to Xit.
Straw Flood and draw to Spot
on 2 sets of dancers.
S.S.L. 2 on man. *Cue:* After
ann'cem't he *turns* to conduct
the Band. *Blind quickly.*
W.S.R. 2 (Girl) When Boys
enter: Draw to Flood till fin-
ish of act. Cover 3 for Bows.
And 2 after close in.

My Sheet

OPEN—NOTHING—TILL
CUE—FOUR (4) BOYS IN ONE EXIT—A-S-R—1ST. ENT.
ON MAN TILL
CUE—FINISH OF ANNOUNCEMENT, A-S-C ON 5—HOLD
THERE TILL
CUE—VIOLINIST FALLS ASLEEP AND DROPS VIOLIN,
BLUE S-R 2ND ENT. ON GIRL, FOLLOW TILL
CUE—SHE EXITS, CHANGE QUICK TO A-S, FOLLOW
TILL
CUE—SHE IS BY MAN, COVER 2 AT AXIT. BLIND TILL
CUE—BAND STARTS TO PLAY, A-F TILL
CUE—FINISH OF NO., W-S LEADER TILL
CUE—FINISH OF RECITATION AND BOW, A-S-R 3 ENT.
ON GIRL TILL
CUE—GIRL EXITS A HEAD, S-L 2ND ENT. ON VIOLIN-
IST TILL
CUE—SINGER JOINS HIM, COVER 2 TILL
CUE—THEY EXIT, S-F TILL
CUE—TWO—(2)—DANCERS ARE C, S-S THEM, FAVOR
WORKER TILL
CUE—FINISH OF DANCE, S-F TILL
CUE—2 DANCERS ENTER, S-S THEM, FAVOR WORKER
TILL
CUE—FINISH OF DANCE, S-F FOR BOW TILL
CUE—MAN ENTERS L 2ND ENT., S-S HIM TILL
CUE—HE TURNS BACK TO YOU TO CONDUCT BAND—
BLIND TILL
CUE—AT FINISH OF BAND NO.,—GIRL ENTERS R 2ND
ENT.,—W-S HER TILL
CUE—2 BOYS ENTER,—W-F TILL FINISH OF ACT,—
W-S-C 3 FOR BOWS TILL
CUE—2 STEP INTO—1—W-S THEM FOR BOWS

Cues should always be typewritten in capital letters and all lines double-spaced, so that it will be easy to read the sheet while working.

In the matter of cue sheets it is impossible to secure the best results unless both the artist and projectionist are congenial and able to make suggestions which are mutually helpful. Of course, the artist should always be given just the sort of effect he desires, but a projectionist may often make very helpful suggestions as to the proper colors or combinations of colors.

But in all instances the projectionist should insist on the artist going over the cue sheet very carefully, after which he may recopy it or not, as he chooses. But I shall always make my own cue sheets, even though that of the artist apparently cannot be improved upon.

What Projectionists Are Doing

Local 548 — Greenville, Tex.

A GENIAL crowd of members of Local 548 gathered about a long table at the Washington Hotel in Greenville on Sunday afternoon, January 22, for the long-heralded "Vampire Dinner." Secretary-Treasurer C. K. Peters, Jr., presided.

The guests smacked their lips over the Theda Bara soup, and there wasn't a dry eye when it came to slaughtering the dainty Pickford peas. But feeling ran high when along came the red, rare roast beef with Talmadge gravy—rich, luscious, just like our own Norma. And the Dorothy Dalton salad... but, alas, just like dear old Dorothy, there wasn't much dressing. Gloria Swanson pie, good to look at and just as good to eat.

Then followed fruit with Bebe Daniels as its patron; the soft luxuriance of a peach, those flashing eyes transformed into the flashes of the purple grape, strawberry-red lips (a-a-ah me); the Pacific fruit express never carried fairer fruit than that which graced that festive board.

Low, discordant rumblings are heard. Ah hah! Enter the dark villain, coffee; little Kid Victrola, he of the black record. Swarthy hair, sable garb, dark pools of eyes...? Pola Negri!

And ushers! Although imagination soars to dizzy heights under the influence of blushing waters,—yet—yes! it is they: Isadora Duncan and Mae Murray gayly attired in a moth's kimono. But, curses! coffee, the dark villain, dispelled the beauteous illusion, and it was after all only the usual white-frocked Ethiopians scurrying hither and thither for the expected bakish.

Speeches and bon mots? Oh, yes. The toastmaster just bubbled over with them, and so did everybody else present. Each one was called upon to answer a toast, so there was merriment galore. Terrell Jones was petrified into "Silent Cal" when called upon to answer, "The mystery of saying nothing," while Brother Peters blushed entrancingly at the query, "How to furnish a star's bedroom." The dinner ended shortly after tentative plans were outlined for the forma-

tion of a secret society: "Independent Order of Vampire Chasers," with Clark De Busk as King of the Court. Much of the credit for the success of the dinner is due the Entertainment Committee, comprised of the Officers of the Local.

* * *

In the annual election of officers of Local 548, the entire ticket headed by Terrell Jones, who has been returned to office for five consecutive times, was retained in office. The official family of Local 548 for the coming year follows: President, Terrell Jones; Vice-President, Arnold Ullery; Secretary-Treasurer, C. K. Peters, Jr., re-elected for the ninth time in as many years; Business Agent (Greenville), Clark De Busk; Business Agent (Paris), Bill Beverly.

On the Board of Trustees will be B. J. Tate, Clark De Busk and C. K. Peters, Jr. The Greenville Executive Board will be manned by Earl Byous, Glenn Ullery, and Ben Powell.

Every member of the Local voted in this election. The vote for the Terrell ticket was almost unanimous. Under its present directors, Local 548 looks forward with confidence to a year of progress and the advancement of the constructive program it has mapped out for itself.

C. K. PETERS, Jr.

Local 302 — Calgary, Can.

The recent meeting of the Alberta Federation of Labor was a fine session, in which many questions bearing on the progress of Union Labor were discussed. Much good will result for Unionism in the motions voted at this gathering.

Brother Allen, Secretary of District 12, and Brother McLean, both members of Local 360, were present at one of our regular meetings this past month, and the members of Local 302 were pleased to have these men with them. Also in attendance at this meeting was Brother Franklin of our sister Local 212.

It is very pleasing to see that the Civil Servants of Alberta as an association have joined the International Trade and Labor movement.

Local 302 has decided to again affiliate with the Canadian Labor

Party, which organization, incidentally, has a new Board of Officers, who are expected to accomplish good work for the party.

D. B. MacKENZIE.

Local 331 — Temple, Tex.

The annual election of officers of Local 331 was held on Sunday, December 4. With one exception, the official family of the Local for 1927 was retained in office for 1928.

Officers of Local 331 for the coming year follow: President, William McDonough; Vice-President, William Timeaus; Business Representative, Donald A. Pinkston; Secretary-Treasurer, Herman E. Meinscher; Recording Secretary, S. Elton Burdette; Guardian, Frank J. Arthur. On the Projectionist Examining Board are H. E. Meinscher, S. E. Burdette, and D. A. Pinkston.

* * *

On December 22 all members of Local 331 were the guests of Tom S. Wright at a banquet at B. P. O. E. Lodge No. 138. The banquet was given to the Projectionists and Stage Hands in appreciation of their efforts in helping to make the annual Elks-Salvation Army Benefit Show a big success. The proceeds of this Show went to swell the Christmas Fund for the Poor, which is used to buy food and clothing for the poor of this city.

* * *

The thirteenth annual banquet in honor of the incoming and retiring officers of the Local was held on New Year's Day. The past record of the Local was reviewed, and a promise of progress in the future was the keynote of the banquet speakers.

Continuing until the wee sma' hours of the morning, the banquet was voted a complete success by everyone present.

H. E. MEINSCHER.

Local 641—Ark. City, Kan.

With relation to the discussion in the January issue of THE PROJECTIONIST of the establishment of a Complaint Department to which could be reported cases of bad film, it might be interesting to know

(Continued on page 27)

Saying it with Insurance

By A. L. CRISWELL

MORE than six years ago, the subject of life insurance for the members was first broached to Local Union No. 171 of Pittsburgh, Pa., and immediately there occurred the usual outburst of invective against the proposal. Many arguments were advanced against the proposal and it was stated that a Labor Union was not a fraternal organization and the proposition of mixing fraternalism with Unionism would be like mixing oil and water. It was thought by many at that time that the expenditure necessary to secure life insurance protection would prove to be too great a burden for the Local to assume.

Gradually a change was brought about in the attitude of the members. It was explained over and over again that organized Labor was the greatest fraternal organization in existence and any proposal that served to weld the members into a closer fraternity would be of undoubted benefit to the Labor movement as a whole. Soon there was an awakening and a new spirit of understanding. With the adoption of the group insurance plan to Labor Unions by many of the great insurance companies, the problem of financing the proposal was lessened and the cost of this protection reduced to a point where it could be given serious consideration even by the smaller Labor Unions without a great reserve fund to start them along the road to independence.

For the Labor Union interested in insurance, there are a number of plans which can easily be adapted to the needs of each organization. For the Local looking for insurance with low initial cost, the greatest factor, there is the straight group insurance which will probably be found within the resources of most organizations. The actual working plan of this form of insurance and the cost differs with the company offering it. The cheapest grades of this group insurance offer policies with no cash surrender value and no payment of dividends upon the policy. This form usually provides for the doubling of the indemnity in the event of accidental death and the payment of the face of the policy in monthly installments in the event of certain disabilities being incurred.

Then there is the form of group insurance that provides for the payment of dividends and includes the accidental death and disability clauses in the policy. While this form is of slightly higher first cost, in the majority of instances, it will be found that, over a period of years, the basic cost is just a trifle higher than the first mentioned group insurance plan. Another plan which has many good features but is beyond the resources of most organizations is the insurance of the members under an adaptation of ordinary life insurance on a wholesale basis. While these policies have a cash-surrender value and pay dividends, the first cost of the premiums is as a rule, higher than we can consider. Over a period of say, ten years, this form will probably cost no more than straight group insurance because, after all, life insurance is based on a certain basic cost per thousand and while the premium cost varies in different forms of insurance, the actual cost remains the same in most cases. The difference is in the policy features. Most of the larger insurance companies are in a position to quote prices on these plans and for the direct return of this revenue to organized Labor, we have

the Union Labor Life Insurance Co., of Washington, D. C., which has been organized for and by members of the American Federation of Labor.

For the Union with a large capital reserve, probably the best plan of all can be adopted. If the plan is worked as it should be, with freedom from interference by changes in local politics, with men at the head of it who will use good judgment, this type of organization can finance its own plan which can be successfully worked provided nothing short of a plague or national calamity hits it. The first item needed is a reserve fund that will take care of approximately ten per cent of the total membership of the organization. This reserve fund, invested in good substantial securities and in Building and Loan companies scattered over a wide territory so as to guard against complete loss at any time, will be constantly added to by various means. Members will be assessed a certain predetermined amount for this protection and the interest from the reserve fund itself will soon cause it to grow. Briefly, this plan is nothing more than the establishment of a life insurance company on a small scale, with the Union itself securing the profits from its operation. Modifications of this plan can be suggested that would apply to practically all of the larger organizations, and it may be amplified by the individual organizations to cover also total and permanent disabilities and sick and accident insurance although at a greater cost to the Union.

Any insurance plan must of course be adapted to the individual needs of the Union and these needs are many and varied. For a trial period of one year, Locals Nos. 3 and 171 of Pittsburgh, have adopted a group insurance plan but in the near future a plan will be presented which can be specifically applied to each union at a small cost per member per year. Roger J. McKelvey, Chairman of the Relief Committee of Local 171, together with Arthur G. Williams, Business Representative and the writer, constitute the authors of the present insurance plan in Pittsburgh.

When this committee started to function as a Relief Committee, its sole working capital consisted of Ten Dollars plus the good will of the membership of the Local. To Mr. Eugene L. Connelly, General Manager of the Harris Amusement Company, must go the credit for making the plan feasible by supplying the funds to give it its start. While discussing plans for the annual N. V. A. Benefit performance, Mr. Connelly suggested that a similar performance be given for the benefit of the Relief Funds of Locals Nos. 3 and 171, and offered the use of one of his theatres to give the movement a beginning. Mr. Connelly secured the co-operation of the Theatre Managers Association and the problem of securing entertainers for the performance was solved. Vaudeville and legitimate artists appearing in Pittsburgh volunteered their services and the Pittsburgh Federation of Musicians furnished three orchestras, including one symphony orchestra, for the occasion. With this spirit of co-operation, it was only natural that the performance was a complete success both from an artistic and a financial standpoint. It is planned that two of these performances will be given annually and the proceeds will go in their entirety to the Relief Funds of Locals Nos. 3 and 171.

(Continued from page 25)

about the efforts of Local 641 to this end.

All Projectionists in Local 641 are required to inspect all film before and after each showing. They are supplied with note books for this purpose, in which is entered the name and number of the print, the date the film was received, and its condition when received.

This system of recording each print has proved an excellent policy, our records being of great importance when any exchange advances the argument that the Projectionist is at fault for bad film.

Our Projectionists are also required to take off the ends of reels all changeover marks, and he is supplied with a note book in which to enter the changeover cues. It is surprising in what bad condition many prints of first-class pictures are received, some of them requiring the cutting of as much as fifteen feet at the end of the reel which has been paper-marked, punched, cut and whatnot.

We of Local 641 believe that the continuation of our policy of recording prints will in time eliminate any trouble from bad prints.

CHARLES H. GREASY.

Local 366 Westchester, N. Y.

The Second Annual Ball for the Death Benefit Fund of Local 366 was held on January 31 at Turn Verein Hall, Mount Vernon.

The Ball was attended by a capacity crowd, included in which were many visiting delegations from neighboring cities. In addition to the entire membership of Local 366, there were present at the Ball, International President of the I. A. T. S. E., William F. Canavan; Assistant President Harry Dignam; William Lang, Manager of the Claim Department; President Sam Kaplan and the entire Official Family of Local 366, together with many members of Local 306.

Two orchestras supplied music for dancing at the Ball. The affair was a great success, the Death Benefit Fund profiting thereby to the extent of more than \$4,000 as a result of the sale of tickets and through advertising in the Souvenir Program.

Every member of Local 366 worked hard for weeks in advance to make the Ball the great success it was.

JOSEPH STERN.

Local 171 — Pittsburgh, Pa.

Pittsburgh projectionists are all agog over the impending opening of the Stanley Company of America's new Stanley Theatre, which is due to take place about February twentieth. At least ninety per cent of the membership are casting longing looks in its direction, because it is rumored that the theatre will contain one of the finest equipped projection rooms in the country.

The plans for the theatre call for a projection suite of four rooms, with a shower bath for the comfort of the projectionists as one of the features. Special attention is being paid to the ventilation of the suite, and during the warm summer months, refrigerated air will be forced into the rooms. The projection staff has not as yet been selected, but will probably be announced in the next issue of the PROJECTIONIST.

Mr. James Balmer, at present manager of the Grand Theatre, will have the direction of the new theatre, according to an unofficial announcement, and Mr. James N. McGrath, President of Local No. 3 and widely known throughout the country as "The Big Train," will have charge of the stage presentations. With the two "Big Jims" at the head of this enterprise, many innovations in stage presentations are expected to emanate from the theatre. Mr. McGrath has been Stage Manager of the Alvin Theatre and President of the Stage Employees Local for many years, and has an enviable reputation as a master of stage-craft. He designed and equipped the stage of Syria Temple, which stands as a model of stage equipment, and is responsible for the design of many large stages in the Pittsburgh district.

It is said that this new Stanley Theatre will be one of the most beautiful theatres west of New York. It is admirably situated in the heart of the shopping district of downtown Pittsburgh.

* * *

With the co-operation of the Stage Employees, Projectionists, Musicians, Artists, and members of the Theatre Managers' Association of Pittsburgh, a benefit performance to buy food and clothing for the wives and little children of the striking members of the United Mine Workers in this district was held at the Davis Theatre, Thursday, midnight, January 19.

The money obtained will be used

in relief work in Allegheny County, where the suffering among the miners and their families is very acute. Practically every Artist appearing in Pittsburgh was at the benefit and gave freely of their talent. Thurston, the "Master Magician," made a personal appearance and announced that a performance would be staged at The Pitt Theatre by his company for the same cause on Friday afternoon, January 27.

Another performance, planned for January 26, at the Sheridan Square Theatre, will be held by the same agencies and the proceeds presented to the Miners' Relief Fund. All funds are being handled through the Central Labor Union, and every penny received will be used for relief work. All expenses of the performances including the printing of tickets has been donated by the Managers' Association at the instance of Mr. Eugene L. Connelly, Secretary of the Association, and Mr. Charles Strakosch, of the Stanley Company.

* * *

According to an item recently published in the Pittsburgh *Post-Gazette*, Daniel V. Flask, a member of the Pittsburgh Projectionists' Union, takes a wagon-load of nickels and dimes to the bank every week because the "public will try anything once." He is the man behind the automatic perfume spraying machines which adorn the walls of rest rooms in theatres, clubs, stores, hotels, dance halls and other more or less public places.

He makes you smell sweet for a nickel, and more lastingly odoriferous for the small sum of 10 cents. It was Mrs. Flask who discovered the machines while on a trip to Buffalo, N. Y., and sensed the possibilities in the device that was later to make an army of Pittsburghers fragrant.

The best paying machine is in a large downtown theatre. It yields \$40 a month. Flask gets seventy-five per cent of the total. The proceeds to date included hairpins, hundreds of pennies, car checks, coins from every land, and several \$5 gold pieces.

"So far I've had only one complaint," says the perfume-spray baron. "One man tried to tear down the machine and the manager of the theatre had him arrested. He said he put fifteen cents in and hadn't been sprayed. It cost him fifteen dollars to get out—all because he was drunk and couldn't smell the perfume. He had been sprayed three times and didn't know it."

A. L. CRISWELL.

Classified Index of Manufacturers and Dealers

Dealers

ALABAMA

Queen Feature Film Co., 1916½ Morris Ave., Birmingham, Ala.

ARIZONA

Arizona Film Supply Co., 323 Morley Ave., Nogales, Ariz.
Chester L. Dietderich, 100-A Pleasant St., Prescott, Ariz.

ARKANSAS

Butler Theatre Supply Co., Russellville, Ark.
Ensor & Co., 215 W. 3rd St., Little Rock, Ark.
Southern Film & Supply Co., 111½ Main St., Pine Bluff, Ark.

CANADA

Cameron Bros. Theatre Sup. Co., Regina, Can.
Canadian Theatre Supply Co., 22 Dundas St., West Toronto, Can.
Canadian Theatre Supply Co., Winnipeg, Can.
Coleman Elec. Co., 258 Victoria St., Toronto, Can.
Electrics, Ltd., Montreal, Quebec, Can.
Perkins Elec. Co., 21 Wilton Sq., Toronto, Ont.
Perkins Electric Co., 2027 Bleury St., Montreal, Can.
Perkins Electric Co., 402 Film Exchange Bldg., Winnipeg, Can.
Perkins Electric Co., Ltd., Wilton Square, Toronto, Can.
Aron Stevens, 224 Eighth Ave., Calgary, Can.
Theatre Equipment Supply Co., 553 Granville St., Vancouver, Can.
United Electric Co., Ltd., 118 Granville St., Vancouver, B. C., Can.
Wells Bros. Amusement Co., Sylvan Ave., Toronto, Can.

CALIFORNIA

Bell & Slimson, 433½ E. 3rd St., Los Angeles, Cal.
Breck Photoplay Supply Co., 2028 S. Vermont Ave., Los Angeles, Cal.
Breck Photoplay Sup. Co., 98 Golden Gate Ave., San Francisco, Cal.
California M. P. Equip. Co., 836 S. Olive St., Los Angeles, Cal.
Davis Bros., 187 Golden Gate Ave., San Francisco, Cal.
Al. Du Bus, 1072 Wilton Pl., Los Angeles, Cal.
Electrical Products Co., 1128 W. 16th St., Los Angeles, Cal.
G. Gennert, 917 Maple Ave., Los Angeles, Cal.
Ed H. Kemp, 309 Turk St., San Francisco, Cal.
Los Angeles Motion Picture Co., 215 E. Washington St., Los Angeles, Cal.
Herbert S. Mace, Redlands, Cal.
Miles Bros. of California, 1149 Mission St., San Francisco, Cal.
National Theatre Supply Co., 1910 So. Vermont St., Los Angeles, Cal.
National Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.
National Theatre Supply Co., 147 Leavenworth St., San Francisco, Cal.
Walter G. Preddy, 187 Golden Gate Ave., San Francisco, Cal.
S. L. Russel, Film Exchange Bldg., Los Angeles, Cal.
J. Slipper & Co., 838 S. Olive St., Los Angeles, Cal.
Southern Electrical Supply Co., 3rd and East Sts., San Diego, Cal.
Theatre Ltg. & Equip. Co., 253 Golden Gate Ave., San Francisco, Cal.
Theatre Equipment Supply Co., 146 Leavenworth St., San Francisco, Cal.
Theatre Supply Co., 1956 Vermont St., Los Angeles, Cal.
Western Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.

CENTRAL AMERICA

J. Carter Searcy, Guatemala City, Guatemala.

COLORADO

National Theatre Supply Co., 2106 Broadway, Denver, Colo.

This entire Index is corrected monthly. So far as possible it embraces every product, every manufacturer and every dealer of interest to projectionists. Manufacturers and Dealers are requested to look over this index carefully and report to us at once if their names are missing, wrongly spelled or wrong address listed. Insertions and corrections will be made at once.

CONNECTICUT

Corrigan's Theatre Equip. Co., 50 W. Main St., Waterbury, Conn.
National Theatre Supply Co., 131 Meadow St., New Haven, Conn.
Repas, Harries & Co., 255 Franklin Ave., Hartford, Conn.
Conn. Independent M. S. Co., 131 Meadow St., New Haven, Conn.
Independent M. S. Co., 131 Meadow St., New Haven, Conn.

DELAWARE

Carl B. Rehder, Wilmington, Del.

FLORIDA

Amusement Supply Co., 312½ Twigg St., Tampa, Fla.
Drollinger Theatre Supply Co., 9 S. Lee St., Jacksonville, Fla.
Griffith, G. W., Box 2333, Tampa, Fla.
Tampa Photo & Art Supply Co., 314 Twiggs St., Tampa, Fla.

GEORGIA

Consolidated Film & Supply Co., 111 Walton St., Atlanta, Ga.
National Theatre Supply Co., 102½ Walton St., Atlanta, Ga.
Southern Theatre Equipment Co., 9 Nassau St., Atlanta, Ga.
Eugene Wilde, P. O. Box 102, Atlanta, Ga.

ILLINOIS

Acme M. P. Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Amusement Supply Co., 740 S. Wabash Ave., Chicago, Ill.
Burke & Jones, Chicago, Ill.
Capital Merchandising Co., 536 E. Dearborn St., Chicago, Ill.
Chicago Stg. & Ltg. Co., 112 N. LaSalle St., Chicago, Ill.
Chicago Cinema Equip. Co., 820 So. Tripp Ave., Chicago, Ill.
C. G. Demel, 845 S. State St., Chicago, Ill.
Exhibitors' Supply Co., 825 So. Wabash Ave., Chicago, Ill.
Fulco Schaffer Sales Co., 24 E. 8th St., Chicago, Ill.
E. E. Fulton Ct., 1018 So. Wabash Ave., Chicago, Ill.
Holke Theatre Supply Co., 845 So. State St., Chicago, Ill.
Joseph Hopp, 57 E. Jackson Blvd., Rm. 604, Chicago, Ill.
Illinois Theatre Equip. Co., 12-14 E. 9th St., Chicago, Ill.
Kiefer Elec. Supply Co., Peoria, Ill.
Midwest Ticket & Supply Co., 845 So. Wabash Ave., Chicago, Ill.
Monarch Theatre Supply Co., 724 So. Wabash Ave., Chicago, Ill.
Movie Supply Co., 844 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 825 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 624 So. Michigan Ave., Chicago, Ill.
Roval Theatre & Supply Co., 180 East Ave., Kankakee, Ill.
Joseph Spradler, 12-14 E. 9th St., Chicago, Ill.
Western Motion Pictures Co., 102 W. Main St., Danville, Ill.
Co-operative Amusement & Supply Co., Gaiety Theatre Bldg., Springfield, Ill.

Dealers

INDIANA

Exhibitors Supply Co., 128 W. Ohio St., Indianapolis, Ind.
Fort Wayne Engineering & Supply Co., 6th and No. Harrison Sts., Fort Wayne, Ind.
Fulco Sales Co., 111 So. Capitol Ave., Indianapolis, Ind.
E. E. Fulton Co., 111 So. Capitol Ave., Indianapolis, Ind.
H. Liever Co., 24 W. Washington St., Indianapolis, Ind.
Muncie Film Supply Co., 202½ E. Main St., Muncie, Ind.
National Theatre Supply Co., 128 W. Ohio St., Indianapolis, Ind.

IOWA

Blackmore, W. F., 315 Brady St., Davenport, Iowa.
Dubuque Sales Co., 2734 Jackson St., Dubuque, Iowa.
Eastman Kodak Stores, Inc., 608 Pierce St., Sioux City, Iowa.
Exhibitors' Supply Co., Des Moines, Iowa.
National Theatre Supply Co., 1004 Grand Ave., Des Moines, Iowa.
National Theatre Supply Co., 10th and High Sts., Des Moines, Iowa.
Zimmerman Brothers, Sioux City, Iowa.

KANSAS

Southwest Theatre Equipment Co., Wichita, Kans.

KENTUCKY

American M. P. Co., Alamo Theatre Bldg., Louisville, Ky.
Blake Amusement Co., 435 So. 3rd St., Louisville, Ky.
Scheckler, Arthur V., Tyler Bldg., Louisville, Ky.
Louisville Film & Supply Co., Rex Theatre Bldg., 555 So. 1st St., Louisville, Ky.

LOUISIANA

Consolidated Film & Supply Co., 914 Craver St., New Orleans, La.
Crescent City Film Exchange, 621 Poydras St., New Orleans, La.
Electrical Supply Co., 324 Camp St., New Orleans, La.
Harol M. P. Industries, 610 Baronne St., New Orleans, La.
National Theatre Supply Co., 610 Saratoga St., New Orleans, La.
Southern Theatre Equipment Co., New Orleans, La.
Southern Theatre Service, 1219 Alvar St., New Orleans, La.
Vivirito, George, 318 Batonna St., New Orleans, La.

MAINE

Pine Tree State Amusement Co., 85 Market St., Portland, Maine.

MARYLAND

Dusman, J. F., 213 No. Calvert St., Baltimore, Md.
Haele, N. C., 228 Gay St., Baltimore, Md.
Lewy Studios, 853 No. Eutaw St., Baltimore, Md.
National Theatre Supply Co., 228 Gay St., Baltimore, Md.
Townsend, H. S., 1625 E. 29th St., Baltimore, Md.
Wyatt, E. J., 1605 No. Milton Ave., Baltimore, Md.

MASSACHUSETTS

Eastern Theatre Equip. Corp., 65 Broadway, Boston, Mass.
Exhibitors' Supply Co., 67 Church St., Boston, Mass.
Gately, J. F., 33 Lyman St., Springfield, Mass.
Handy, A. D., Boston, Mass.
Independent Theatre Supply Co., 49 Church St., Boston, Mass.
Marson, R. D., 106 Broadway, Boston, Mass.
National Theatre Supply Co., 69 Church St., Boston, Mass.

When writing to Manufacturer or Dealer for information please mention the MOTION PICTURE PROJECTIONIST

Dealers

Rotman, Morris, 26 Browning Ave., Dorchester, Mass.
 United Theatre Equip. Co., 26 Piedmont St., Boston, Mass.
 Wells & Douglas, 1108 Boylston St., Boston, Mass.
 Wetmore, B. C., 2 Park Sq., Boston, Mass.
 Wheaton, L. B., Worcester, Mass.
 Worcester Film Corp., 340 Mason St., Worcester, Mass.

MICHIGAN

Amusement Supply Co., Film Bldg., Detroit, Mich.
 Cinema Ser. Co., 141 Elizabeth St., E., Detroit, Mich.
 Exhibitors' Supply Co., 14 Elizabeth St., Detroit, Mich.
 Feldstein, A. N., 1670 Pasadena Ave., Detroit, Mich.
 Theo. Kundtz & Co., 402 Lincoln Bldg., Detroit, Mich.
 McArthur Equip. Co., 1963 Grand River Ave., Detroit, Mich.
 National Theatre Supply Co., 2105 John R St., Detroit, Mich.
 Service Theatre Supply Co., 137 Elizabeth St., Detroit, Mich.

MINNESOTA

Cunningham, H. B., 964 University Ave., St. Paul, Minn.
 Exhibitors' Supply Co., 612 Producers' Exchange Bldg., Minneapolis, Minn.
 General Distributing Co., 110 Lake Ave., So. Duluth, Minn.
 Huntleys, The, Winona, Minn.
 Lochran Film & Slide Service, 706 Film Exchange Bldg., Minneapolis, Minn.
 National Equipment Co., 409 W. Michigan Ave., Duluth, Minn.
 Northern Theatre Supply Co., 221 Loeb Arcade, Duluth, Minn.
 Rialto Theatre Supply Co., 56 Western Ave., Minneapolis, Minn.
 Rialott Co., The, Minneapolis, Minn.
 Standard Equipment Corp., 39 Western Ave., Minneapolis, Minn.
 Teco Products Mfg. Co., 245 Loeb Arcade, Minneapolis, Minn.
 Twin City Caldium & Supply Co., 706 First Ave., N., Minneapolis, Minn.
 United Theatre Supply Co., 34 Western Ave., Minneapolis, Minn.
 The Western Equip. Exchange, 35 Western Ave., Minneapolis, Minn.

MISSISSIPPI

Southern Theatre Service, P. O. Box 455, Grenada, Miss.

MISSOURI

Cole Theatre Supply Co., 109 W. 18th St., Kansas City, Mo.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Exhibitors' Supply Co., 3316 Lindell St., St. Louis, Mo.
 Fulco-Schaffer Co., 3301 Olive St., St. Louis, Mo.
 Fulton, E. E., & Co., 3403 Olive St., St. Louis, Mo.
 National Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 National Theatre Supply Co., 3315 Olive St., St. Louis, Mo.
 Opera Supply Co., 601 Shubert Bldg., St. Louis, Mo.
 Sanderson Elec. Co., St. Louis, Mo.
 Schweig & Engel Theatre Supplies, St. Louis, Mo.
 Star Film & Supply Co., 413 Edward St., St. Joseph, Mo.
 Stehbins, Charles M., Picture Supply Co., 1822 Wyandotte St., Kansas City, Mo.
 Yale Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 A-A Electric Machinery Co., 1117 Cherry St., Kansas City, Mo.

MONTANA

Western Theatre Equipment Corp., Billings, Mont.

NEBRASKA

Eastman Kodak Stores, Inc., Lincoln, Neb.
 Exhibitors' Supply Co., 1518 Davenport St., Omaha, Neb.
 Lincoln Photo Supply Co., Omaha, Neb.
 National Theatre Supply Co., 1514 Davenport St., Omaha, Neb.
 Service Theatre Supply Co., 303 No. 16th St., Omaha, Neb.

Dealers

U. S. Theatre Supply Co., 1506 Davenport St., Omaha, Neb.
 United Theatre Equip. Corp., 323 So. 15th St., Omaha, Neb.
 Western Supply Co., 2581 Kansas Ave., Omaha, Neb.
 Western Theatre Supply Co., 15th and Davenport Sts., Omaha, Neb.

NEW JERSEY

Kaufman, Frank N., 750 Broad St., Newark, N. J.
 Metropolitan Motion Picture Co., 116 Market St., Newark, N. J.

NEW MEXICO

Eastern New Mexico Theatre Supply Co., Box 348, Clovis, N. M.

NEW YORK

J. F. Adams, 459 Washington St., Buffalo, N. Y.
 Acme Exchange, 341 W. 44th St., N. Y. City.
 Amusement Supply Co., 729 Seventh Ave., N. Y. City.
 Auburn Film Co., Auburn, N. Y.
 Auburn Theatrical Supply Co., Auburn, N. Y.
 A. Z. Motion Picture Supply Co., 266 Houston St., N. Y. City.
 A. Z. Motion Picture Supply, 1413 Bedford Ave., Brooklyn, N. Y.
 Becker Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Behrend Motion Picture Supply Co., 729 Seventh Ave., N. Y. City.
 Bender, George, 28 Centre St., N. Y. City.
 Better Service Film Co., 110 Ferris Ave., Syracuse, N. Y.
 Capitol Motion Picture Supply Co., 727 Seventh Ave., N. Y. City.
 Capitol Stg. & Ltg. Co., 626 Tenth Ave., N. Y. City.
 Columbia Stg. Ltg. Co., 709 Columbia Theatre Bldg., N. Y. City.
 Crouse, Hinds Co., Wolf and 7th Sts., Syracuse, N. Y.
 Crown Motion Pic. Supplies, 729 Seventh Ave., N. Y. City.
 Empire Theatre Supply Co., 42 Orange St., Albany, N. Y.
 Empire Theatre Sup. Co., 619 Spring St., Utica, N. Y.
 Fenveyssey, Carol, Rochester, N. Y.
 Gennert, G., 24 E. 13th St., N. Y. City.
 Greenbaum, 436 Cornelius St., Brooklyn, N. Y.
 Herbert & Huesgen, 18 E. 42nd St., N. Y. City.
 Hudson Elec. Equip. Co., 141 W. 44th St., N. Y. City.
 Independent Movie Sup. Co., 42 Orange St., Albany, N. Y.
 Lyon, J. T. & D. B., Schenectady, N. Y.
 Kaplan, Sam, 729 Seventh Ave., N. Y. City.
 Mason, Chas. E., 103 W. Main St., Rochester, N. Y.
 Mestrum, H., 817 Sixth Ave., N. Y. City.
 Modern Elec. Mch. Co., 2927 Third Ave., N. Y. City.
 Motion Picture Apparatus Co., 110 W. 32nd St., N. Y. City.
 Motion Picture Service Co., 417 W. 44th St., N. Y. City.
 National Theatre Supply Co., 1560 Broadway, N. Y. City.
 National Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Perfection Supply Co., 98 Park Pl., N. Y. City.
 S & M Sales Co., 123 Lafayette St., Utica, N. Y.
 Supreme Motion Picture Repair Co., 926 Broadway, Brooklyn, N. Y.
 Syracuse Supply Co., 314 W. Fayette St., Syracuse, N. Y.
 United Proj. & Film Corp., 51 Chapel St., Albany, N. Y.
 United Proj. & Film Corp., 228 Franklin St., Buffalo, N. Y.
 Univ. Elec. Stage Ltg. Co., 321 W. 50th St., N. Y. City.

NORTH DAKOTA

McCarthy Supply Co., 619 N. P. Ave., Fargo, N. D.

NORTH CAROLINA

A. & B. Moving Picture Supply Co., Raleigh, N. C.
 Carolina Theatre Supply Co., United Film Bldg., Charlotte, N. C.
 Ettabran Film Co., Charlotte, N. C.
 Exhibitors' Supply Co., Charlotte, N. C.
 National Theatre Supply Co., 222 W. 4th St., Charlotte, N. C.

Dealers

OHIO

American Theatre Equipment Co., 165½ No. High St., Columbus, Ohio.
 American Theatre Supply Co., 310 St. Clair St., Toledo, Ohio.
 Artfilm Co., Cleveland, Ohio.
 Bodiker, D. A., 128 No. Garfield St., Dayton, Ohio.
 Central F. F. Co., 60 Public Sq., Lima, Ohio.
 Cincinnati Theatre Supply Co., Broadway Film Bldg., Cincinnati, Ohio.
 Cincinnati M. P. Co., 1434 Vine St., Cleveland, Ohio.
 Dayton Theatre Sup. Co., 225 Jefferson St., Dayton, Ohio.
 Doner, Frank M., 2409 Maple Wood Ave., Toledo, Ohio.
 Dwyer Bros. & Co., 520 Broadway, Cincinnati, Ohio.
 Exhibitors' Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Folwer & Salter, Cleveland, Ohio.
 Gill Electric Co., 46 Cypress Ave., Columbus, Ohio.
 Gross & Johnson, 2100 Payne Ave., Cleveland, Ohio.
 Limbocker, George, Springfield, Ohio.
 Motion Picture Equip. Co., 17 Ervin Block, West Canton, Ohio.
 Moving Picture Equip. Co., 208 Market Ave., So. Canton, Ohio.
 Moving Picture Supply Co., 439 Falls Ave., Youngstown, Ohio.
 National Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 National Theatre Supply Co., 520 Broadway, Cincinnati, Ohio.
 O'Connor & Co., A., 9702 Euclid Ave., Cleveland, Ohio.
 Oliver Moving Pic. Sup. Co., Film Exchange Bldg., Cleveland, Ohio.
 Post Glover Elec. Co., Cincinnati, Ohio.
 Price, L. M., Co., 108 W. 4th St., Cincinnati, Ohio.
 Romell Motion Pictures, Inc., 1411 Walnut St., Cincinnati, Ohio.
 Runey, Clarence E., 1434 Vine St., Cincinnati, Ohio.
 Standard Film & Service Co., Cleveland, Ohio.
 Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Tri-State Supply Co., 2112 Payne Ave., Cleveland, Ohio.

OKLAHOMA

Andersen Theatre Supply Co., 116 So. Hudson St., Oklahoma City, Okla.
 National Theatre Supply Co., 308 W. California St., Oklahoma City, Okla.
 United Theatre Equip. Corp., 116 So. Hudson St., Oklahoma City, Okla.
 Yale Theatre Supply Corp., 10 So. Hudson St., Oklahoma City, Okla.
 Southern Theatre Equip. Co., 328 California Ave., Oklahoma City, Okla.
 Shelton, J. M., Oklahoma City, Okla.

OREGON

Bentley, E. E., Hillsboro, Ore.
 Conant, C. F., Portland, Ore.
 National Theatre Supply Co., 60 Glisan St., Portland, Ore.
 National Theatre Supply Co., 393 Oak St., Portland, Ore.
 Portland Moving Picture Mch. Co., Rivoli Theatre Bldg., Portland, Ore.
 Service Film & Supply Co., 393 Oak St., Portland, Ore.

PENNSYLVANIA

Alexander, George H., Diamond St., Pittsburgh, Pa.
 Atlas Supply Co., 108 Ring St., Philadelphia, Pa.
 Bates, George, 662 Shade St., Pittsburgh, Pa.
 Bennell, Chas. H., 261 No. Clarion St., Philadelphia, Pa.
 Bennett, C. H., 224 No. 13th St., Philadelphia, Pa.
 Catsiff, J., 1214 Market St., Philadelphia, Pa.
 Chamberlain Amuse, Enter., Inc., Shamokin, Pa.
 Columbia Film Service, 1010 Forbes St., Pittsburgh, Pa.
 Consolidated Film Co., 1237 Vine St., Philadelphia, Pa.
 Electric Theatre Supply Co., 1309 Vine St., Philadelphia, Pa.
 Gompertz, Abram B., Exhibitors' Clearing House & Supply Co., 1243 Vine St., Philadelphia, Pa.
 Hannson, J. G., 10th and Spring Sts., Reading, Pa.

Dealers

Hollis, Smith & Morton, 1024 Forbes St., Pittsburgh, Pa.
 Janicks, Michael, 1105 Gibbon St., Pittsburgh, Pa.
 Morton, Ed. B., 1006 Forbes St., Pittsburgh, Pa.
 Motion Picture Machine Co., 609 Neville St., Pittsburgh, Pa.
 National Theatre Supply, 1024 Forbes St., Pittsburgh, Pa.
 National Theatre Supply Co., 1311 Vine St., Philadelphia, Pa.
 Phila. Theatre Equip. Co., 252 No. 13th St., Philadelphia, Pa.
 Pittsburgh M. P. Supply Co., 1006 Forbes St., Pittsburgh, Pa.
 Rizzo, Clem, 262 No. 13th St., Philadelphia, Pa.
 S & S Film & Supply Co., A. Steinberg, 1026 Forbes St., Pittsburgh, Pa.
 Smith, Harry J., 436 Diamond St., Pittsburgh, Pa.
 Superior Motion Picture Supply Co., 1026 Forbes St., Pittsburgh, Pa.
 Swaab & Son, Lewis M., 1327 Vine St., Philadelphia, Pa.
 Williams, Browne & Earle, 918 Chestnut St., Philadelphia, Pa.
 Cadoret, William H., Theatre Supply Co., Scranton, Pa.
 Equipment Theatre Supply Co., Penn Ave., Scranton, Pa.

RHODE ISLAND

Allen Feature Film Co., Providence, R. I.
 McKenna, James, Providence State Ltg. Co., 12 Moulton St., Providence, R. I.
 Taylor, H. O. & E. S., 76 Dorrence St., Providence, R. I.

SOUTH CAROLINA

Independent Theatre Supply Co., 111 W. Coffee St., Greenville, S. C.

SOUTH DAKOTA

American Theatre Supply Co., Sioux Falls, S. D.

TENNESSEE

Consolidated Film & Supply Co., 226 Union Ave., Memphis, Tenn.
 Monarch Theatre Supply Co., 228 Union Ave., Memphis, Tenn.
 White Theatre Equipment Co., Phipps Bldg., Bristol, Tenn.

TEXAS

Atlantic Sales Co., 1816 Main St., Dallas, Tex.
 Dallas Theatre Supply Co., 1911 Commerce St., Dallas, Tex.
 National Theatre Supply Co., 306 So. Harwood St., Dallas, Tex.
 Peerless Film Svc., 322 San Antonio St., El Paso, Tex.
 Educational Equip. Co., 1913-A Commerce St., Dallas, Tex.
 Simplex Theatre Supply Co., Film Exchange Bldg., Dallas, Tex.
 Simpson, James P., Co., Inc., Dallas, Tex.
 Southern Film Svc., 811 Franklin Ave., Houston, Tex.
 Southern Theatre Equip. Co., 1815 Main St., Dallas, Tex.
 Thrash, R. D. Co., Film Row, Dallas, Tex.

UTAH

Alhambra Theatrical Co., Hudson Ave., Ogden, Utah.
 Argus Enterprises Co., Inc., 132 E. Second St., Salt Lake City, Utah.
 National Theatre Supply Co., 132 E. 2nd St., Ogden, Utah.
 Salt Lake Theatre Supply Co., 48 Exchange Pl., Salt Lake City, Utah.
 Universal Film & Supply Co., 56 Exchange Pl., Salt Lake City, Utah.
 Utah Theatre Supply Co., 125 E. 2nd South St., Salt Lake City, Utah.
 Worman Supply Co., 2429 Hudson Ave., Ogden, Utah.

VERMONT

Allen & Underhill, Chelsea, Vt.
 H. P. Boardman, Burlington, Vt.

Dealers**VIRGINIA**

Burchard, W. A., Co., 56 Commerce St., Norfolk, Va.
 Chocklett, Luther A., Co., Over Mt. Trust Bldg., Roanoke, Va.
 Southern Theatre Supply Co., 25 Old St., Petersburg, Va.

WASHINGTON, D. C.

Capitol Theatre Supply, 316 McGill Bldg., Washington, D. C.
 Carroll Electric Co., 714 12th St., N. W., Washington, D. C.
 Colman, 916 G St., N. W., Washington, D. C.
 Columbia Photo Supply Co., 1424 New York Ave., N. W., Washington, D. C.
 Fuller & D'Albert, 815 10th St., N. W., Washington, D. C.
 Higgins, F. L., 804 11th St., N. W., Washington, D. C.
 L & S Theatre Sup. Co., 908 G St., N. W., Washington, D. C.
 Theatre Supply Co., 916 G St., N. W., Washington, D. C.
 Lust, Sidney B., 916 G St., N. W., Washington, D. C.
 National Theatre Supply Co., 719 9th St., N. W., Washington, D. C.
 Scientific & Cinema Supply Co., 804 11th St., N. W., Washington, D. C.
 Southern Moving Picture Corp., 310 McGill Bldg., Washington, D. C.
 Thompson, E. B., 722 10th St., N. W., Washington, D. C.
 Washington Theatre Supply Co., 719 9th St., N. W., Washington, D. C.

WASHINGTON

Film Supply Co., 217 Virginia St., Seattle, Wash.
 Graham, John W., Spokane, Wash.
 Lowman & Handford, Seattle, Wash.
 National Theatre Supply Co., 1927 Third Ave., Seattle, Wash.
 Shearer, B. F., Inc., 210 Virginia St., Seattle, Wash.
 Spokane Theatre Supply Co., 410 W. 1st St., Spokane, Wash.
 Theatre Supply Co., 2016 Third Ave., Seattle, Wash.

WEST VIRGINIA

Charleston Elec. Sup. Co., Charleston, W. Va.
 Charleston Theatre Supply Co., Charleston, W. Va.
 Columbia Film Svc. Co., 707 Dryden St., Charleston, W. Va.
 Educational Film Co. of West Virginia, Charleston, W. Va.
 McGray & McGray Co., 329 Main St., Fairmont, W. Va.
 Standard Theatre Supply Co., 3608 Jacob St., Wheeling, W. Va.
 West Virginia Amusement & Film Co., 113½ Capitol St., Charleston, W. Va.

WISCONSIN

National Theatre Supply Co., 715 Wells St., Milwaukee, Wis.
 Smith, Ray, Co., Toy Bldg., Milwaukee, Wis.
 Wisconsin Film Corp., 134 Grand Ave., Milwaukee, Wis.
 Wisconsin Theatre Supply Co., 174 2nd St., Milwaukee, Wis.

Manufacturers**Arc Lamps**

Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
 Burke & James, 425 So. Wabash Ave., Chicago, Ill.
 Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
 Cinema Studios Supply Corp., 1438 Beechwood Dr., Hollywood, Cal.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly, Inc., 129 Grand St., New York City.
 Haltherg, J. H., 445 Riverside Dr., New York City.
 International Projector Corp., 90 Gold St., New York City.
 Kiesel Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.

Manufacturers

Max Mayer Co., 218 W. 42nd St., New York City.
 Motion Picture Service Co., 417 W. 44th St., New York City.
 Mestrum, Henry, 817 Sixth Ave., New York City.
 Rollaway Motor Co., 122 Southard Ave., Toledo, Ohio.
 Strong Lamp Co., 3248 Monroe St., Toledo, Ohio.
 Wohl & Co., Inc., M. J., Paynter Ave. and Hancock St., Long Island City, N. Y.

Booths, Projection

A. G. Mfg. Co., Seattle, Wash.
 Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Blaw Knox Co., Bayard and Warner Sts., Baltimore, Md.
 Edward Mfg. Co., Cincinnati, Ohio.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Goldberg Bros., 1646 Lawrence St., Denver, Colo.
 Harry Steel Co., O. K., 2333 Papin St., St. Louis, Mo.
 Johns-Manville Co., 41st St. and Madison Ave., New York City.
 Keasbey & Mattison Co., Dept. N., Ambler, Pa.
 Langslew Co., H. R., 232 Jay St., Rochester, N. Y.
 Mestrum, Henry, 810 Sixth Ave., New York City.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newman Mfg. Co., 416 Elm St., Cincinnati, Ohio.
 Riverside Mfg. Co., Newark, N. J.
 Sharlow Bros., 442 W. 42nd St., New York City.
 Steel Roofing & Stamping Works, 506 S. W. 2nd St., Des Moines, Iowa.
 Thorp Fire Proof Door Co., Minneapolis, Minn.
 Williams, Browne & Earle, Inc., 918 Chestnut St., Philadelphia, Pa.

Carbons

Arco Electric Co., 110 W. 42nd St., New York City.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Diesman, J. D., Baltimore, Md.
 M. G. Felder, 1560 Broadway, New York City.
 Hiegel, Frank J., 440 State St., Schenectady, N. Y.
 National Carbon Co., Madison Ave., N. W., and W. 117th St., Cleveland, Ohio.
 Phellis & Co., C. W.
 Hugo Reisinger, 11 Broadway, New York City.
 Warner Prod. Co., Inc., 265 Canal St., New York City.

Cases and Cans, Reel Carrying

Ajax Film Accessories Co., 30 Church St., New York City.
 American Can Co., New York City, N. Y.
 Bass Camera Co., 109 No. Dearborn St., Chicago, Ill.
 Erker Bros. Optical Co., Olive St., St. Louis, Mo.
 Fulton Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Gotham Can Co., 57 Eagle St., Brooklyn, N. Y.
 Indestructible Metal Products Co., 521 W. 45th St., New York City.
 Los Angeles Can Co., Los Angeles, Cal.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newmade Products Corp., 249 W. 47th St., New York City.
 Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.
 Russakov Can Co., Chicago, Ill.

Cement, Film

Bass Camera Co., 109 N. Dearborn St., Chicago, Ill.
 Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
 Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
 Eastman Kodak Co., Rochester, N. Y.
 Fulton Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 International Projector Corp., 1130 W. Austin Ave., Chicago, Ill.
 Monarch Theatre Supply Co., 1223 So. Wabash Ave., Chicago, Ill.
 Newmade Products Corp., 248 W. 47th St., New York City.
 Rothacker Film Mfg. Co., 1339 Diversey Pkwy., Chicago, Ill.

Manufacturers

Technical Color & Chem. Works, 523 Third Ave., Brooklyn, N. Y.
Weldon Film Cement Co., 301 Loeb Arcade, Minneapolis, Minn.

Film Safes and Cabinets

American Film Safe Corp.
Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
Columbia Metal Box Co., 226 E. 144th St., New York City.
Duplex Motion Picture Industries, 74 Sherman Ave., Long Island City, N. Y.
Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
Film Safe Co., 92 William St., New York City.
Agent for American Film Safe Corp., Baltimore Md.
Fulton, E. E., 3208 Carroll Ave., Chicago, Ill.
Neumade Products Corp., 249 W. 47th St., New York City.
Peterson Co., C. J., 723 Fulton St., Chicago, Ill.
Sharlow Bros. Co., 442 W. 42nd St., New York City.

Film Splicing Machines

Bass Camera Co., 109 N. Dearborn St., Chicago, Ill.
Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
Burke & James, 425 So. Wabash Ave., Chicago, Ill.
Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
Duplex Machine Co., 317 Seventy-Fifth Ave., Brooklyn, N. Y.
Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
Gennert, Inc., G., 24 E. 13th St., New York City.
Grissold Machine Works, Port Jefferson, N. Y.
Loehren Film & Slide Co., Wm. A., 706 Film Exchange Bldg., Minneapolis, Minn.
Neumade Products Corp., 249 W. 47th St., New York City.
Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.

Lamps

Edison Lamp Works of the General Electric Co., Harrison, N. J.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
National Lamp Works, Nela Park, Cleveland, Ohio.
Westinghouse Lamp Co., 150 Broadway, New York City.

Lamps, Reflector

Besseler Co., Charles, 131 E. 23rd St., New York City.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
Goetz American Optical Co., 317 E. 34th St., New York City.
International Projector Corp., 90 Gold St., New York City.
Kliegl Bros. Universal Stage Light Co., Inc., 321 W. 50th St., New York City.
McAuley Mfg. Co., J. E., 552 W. Adams St., Chicago, Ill.
Morelite Co., Inc., 600 W. 57th St., New York City.
Preddy, Walter G., 187 Golden Gate Ave., San Francisco, Cal.
Warren Products, 265 Canal St., New York City.

Lights, Spot

Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
Best Devices, 22 Film Bldg., Cleveland, Ohio.
Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
Burke & James, 425 S. Wabash Ave., Chicago, Ill.
Capitol Stage Lighting Co., 626 Tenth Ave., New York City.
Chicago Electric Sign Co., 2219 Grand Ave., Chicago, Ill.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
De Bus, Al., 1072 N. Wilton Pl., Hollywood, Cal.
Diesman, J. F. D., Baltimore, Md.
Display Stage Lighting Co., 334 W. 44th St., New York City.
Ensawile, R. C., 304 W. 52nd St., New York City.
Erikson, Electric Co., L., 6 Portland St., Boston, Mass.

Manufacturers

Franklin Electric Products Co., 750 Prospect Ave., S. E., Cleveland, Ohio.
Frink, Inc., I. P., 24th St. and Tenth Ave., New York City.
General Electric Co., Schenectady, N. Y.
Hall & Connelly, 129 Grand St., New York City.
Hubb Electric Co., 2219 W. Grand St., Chicago, Ill.
Kansas City Scenic Co., 24th and Harrison Sts., Kansas City, Mo.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Klouchek, Chas. E., 528 Flanders St., Portland, Ore.
Mestrum, Henry, 817 Sixth Ave., New York City.
Motion Picture Service Co., 417 W. 44th St., New York City.
Newton, Chas. I., 224 W. 14th St., New York City.
Perkins Electric Co., 21 Wilton Sq., Toronto, Ont.
Sun Ray Lighting Co., 119 Lafayette St., New York City.
Universal Stage Lighting Co., 321 W. 50th St., New York City.
Wheeler Green Electric Co., 29-39th St., Rochester, N. Y.
Wohl & Co., M. J., Hancock St., Long Island City, N. Y.

Projectors

American Motion Picture Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Baird Motion Picture Machine Co., 31 Runyon St., Newark, N. J.
Bell & Howell Co., 1801 Larchmont St., Chicago, Ill.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
International Projector Corp., 90 Gold St., New York City.
Kaplan, Sam, 729 Seventh Ave., N. Y. City.

Reels, Film

Acme Stamping & Mfg. Co., Pittsburgh, Pa.
Duplex M. P. Industries, Inc., Long Island City, N. Y.
Geometric Stamping Co., 221 E. 131st St., Cleveland, Ohio.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, Ohio.
Goldberg Bros., 1646 Lawrence St., Denver, Colo.
Heigel, Frank J., 440 State St., Schenectady, N. Y.
Mossberg Co., Frank, Attleboro, Mass.
Neumade Products Corp., 249 W. 47th St., New York City.
Sharlow Bros. Co., 442 W. 42nd St., New York City.
Taylor-Shantz Co., 478 St. Paul St., Rochester, N. Y.
Winship & Sons, W. W., Utica, N. Y.

Reflectors, Light

American Reflector & Lighting Co., 100 So. Jefferson St., Chicago, Ill.
Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
Curtis Lighting Co., 1119 W. Jackson Blvd., Chicago, Ill.
Ericksen Electric Co., 6 Portland St., Boston, Mass.
Frink, I. P., Inc., 239 Tenth Ave., New York City.
General Outdoor Advertising Co., 550 W. 27th St., New York City.
Heinrich Reflector Co., 645 W. 43rd St., New York City.
Hub Electric Co., 2219 W. Grand Ave., Chicago, Ill.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Major Equipment Co., Inc., 4603 Fullerton Ave., Chicago, Ill.

Rewinders

Atlas Metal Works, Dallas, Texas.
Automatic Film Rewinder, Harrisburg, Pa.
Bass Camera Co., 109 Dearborn St., Chicago, Ill.
Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill.
Best Devices Co., 1514 Prospect Ave., Cleveland, Ohio.
Duplex Machine Co., 316-75th St., Brooklyn, N. Y.
Electrical Prods. Corp., 1122 W. 16th St., Los Angeles, Cal.
Lang Mfg. Works, Olean, N. Y.
Neumade Products Corp., 249 W. 47th St., New York City.
Stern Metal Works, 1006 Vine St., Philadelphia, Pa.

Manufacturers**Rheostats**

Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
Cuttler Hammer Mfg. Co., Milwaukee, Wis.
Duplex M. P. Industries, Inc., Long Island City, N. Y.
General Electric Co., Schenectady, N. Y.
Hall & Connelly Co., 129 Grand St., New York City.
Hertner Electric Co., 1900 W. 112th St., Cleveland, Ohio.
Hoffman & Sons, 522 First Ave., New York City.
Hub Electric Co., 2219 Grand Ave., Chicago, Ill.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Leonard Electric Mfg. Co., 3709 Perkins Ave., Cleveland, Ohio.
Newton, Chas. I., 331 W. 18th St., New York City.
Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
Wheeler-Green Electric Co., 29 St. Paul St., Rochester, N. Y.

Screens

American Silversheet Co., 915 Washington St., St. Louis, Mo.
Da-Lite Screen Co., 922 W. Monroe St., Chicago, Ill.
Diamond Screen Products Co., 1222 Ontario St., Cleveland, Ohio.
Gardiner Co., L. J., 1021 W. Goodale Blvd., Columbus, Ohio.
Minusa Cine Screen Co., 2665 Morgan St., St. Louis, Mo.
Mirror Screen Co., Shelbyville, Ind.
National Screen Co., 2100 Payne Ave., Cleveland, Ohio.
Premier Screen Co., P. O. Box 861, Roanoke, Va.
Raven Screen Corp., 1476 Broadway, New York City.
Rembusch Screen Co., Shelbyville, Ind.
Royal M. P. Screen Co., 910 Manhattan Ave., Brooklyn, N. Y.
Spencer Lense Co., 442 Niagara St., Buffalo, N. Y.
Story Scenic Co., 21 Tufts St., Somerville Sta., Boston, Mass.
Trans-Lux Daylight Picture Screen, Inc., 247 Park Ave., New York City.
Walker Sunlight Screen Co., 359 Canal St., New York City.
Westner & Son, C. S., 211 N. 13th St., Philadelphia, Pa.
Western Shade Cloth Co., 22nd and Jefferson Sts., Chicago, Ill.

Slides

Acme Slide Studio, 1026 Market St., San Francisco, Cal.
American Slide Co., 165 No. High St., Columbus, Ohio.
Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
Excelsior Illustrating Co., 219 Sixth Ave., New York City.
Kansas City Slide Co., 1015 Central St., Kansas City, Mo.
Loehran, Wm. A., Film Exchange Bldg., Minneapolis, Minn.
Midland Cine Products Co., 706 First Ave., North Minneapolis, Minn.
Milano Slide Co., 112 W. Broadway, Salt Lake City, Utah.
Niagara Slide Co., Lockport, N. Y.
Paramount Publicity Corp., 111 Westchester Sq., Bronx, N. Y.
Radio Mat Slide Co., 167 W. 48th St., New York City.
Ransley, J. F., 337 Madison St., W. Chicago, Ill.
Standard Slide Co., 209 W. 48th St., New York City.
Unique Slide Co., 168 W. 48th St., New York City.
Victor Animatograph Co., Davenport, Iowa.

Tachometers

Weston Electric Instrument Co., 4 Western Pl., Newark, N. J.
Blanchard Instrument Co., Cambridge, Mass.
Consolidated Instrument Co., 41 E. 42nd St., New York City.

Meters, Electrical

Weston Electrical Instrument Corp., 7 Weston Pl., Newark, N. J.
Jewell Electrical Inst. Co., 2 Vesey St., New York City.

Effect Lighting

(Continued from page 14)

to the limitation in intensity of illumination available for such purposes.

Briefly, by way of description, it consists of essentially the same elements as found on the standard double-effect projector in that the necessary framing shutters, iris shutters, special mask holders, and adjustable slide-carriers are mounted, in one assembly, before the condensers of a standard high intensity lamphouse.

Three, or as many as may be desired, projection lenses of graded focal length are used, these lenses being locked in position when once focussed. Each lens is mounted on an adjustable, pivoted arm to permit of its being swung to one side when not in use. The adjustment consists of a thumbscrew for centering each lens in the optic system.

Should a "soft-focus" effect be desired, each lens can be easily and quickly slid on the base tubes to the proper focal position. Means are provided for placing an interchangeable assembly consisting of a light shield, dowsing shutter, and effect holder, before each projection lens.

The entire working mechanism of the projector is carefully counter-balanced and can be easily swung from side to side, or tilted up and down. Effects or gelatines can be placed in holder, either in front of the condenser lens or in front of the respective projection lenses.

It is true, some difficulty is experienced in preventing the colored gelatine, when so placed, from burning up too rapidly although this problem has been solved, after a fashion. Heat resisting colored glasses seem to offer the best solution to this problem.

Conclusion

There is one other method of obtaining animated effects on which little has been said so far; that is, by means of motion picture films projected in the ordinary manner, or by rear-end projection through a translucent screen as is done in the Roxy theater.

This would, after all, seem to be the most logical method and strangely enough, it has been but little used. Natural scenes, otherwise unobtainable, could then be used as the background for prologues and similar work instead of building up effect scenes by use of two or more animated effects.

The principal objection which, undoubtedly, has acted so far to limit this method to strictly special cases, is that it is a more costly means of obtaining something, which in the main, can easily be produced from the front of the house. Then, too, a certain minimum projection distance back stage is required so that most existing theaters would have great trouble in applying the method.

Lastly, strange though it may sound, effects projected by means of strip film, "movie" fashion, do not appear to be as realistic as those obtained in the usual manner. It would appear, therefore, that this method of projection is suited only to the showing of complete natural scenes, unattainable by any other means.

It is quite probable that the "movies" method will find more extensive application, especially in the new theaters although it is quite unlikely that it will seriously encroach upon the now commonly accepted method.

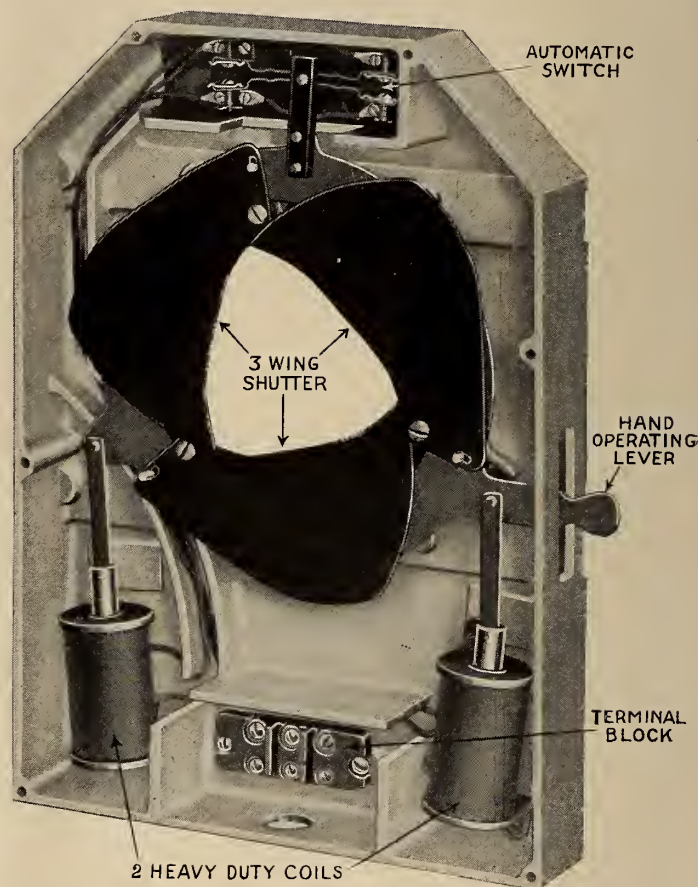
Whatever the outcome, this much seems certain: that effect lighting in motion picture theaters is here to stay and will be even more generally applied in the future, since, to use a rather crude analogy, it represents the "sauce" which makes the "movie" more palatable to the average fan.

*From the Transactions of the S. M. P. E. with permission.

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5. Locks in both open and closed position; absolutely fool proof.
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7. Improved by addition of a terminal block and new type of coil.
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How to True Commutators

(Continued from page 15)

certain, the method is expensive, considered from either of the aforementioned angles, or both. It is dangerous also, for the armature is likely to be damaged in removing it from or replacing it in frame; or in turning, the copper may drag across the mica insulation of the commutator, thus causing a short circuit and possibly burning out a coil in the armature.

Large cuts are also natural results of this method of truing, as well as the shortening of the life of the commutator.

Portable Slide-Rest Method

This method entails considerable difficulty in securing the slide-rest so that it will be rigid enough to true a commutator. Usually the slide-rest is secured in rather a dangerous way, because most floors are either of iron or concrete and thus offer no means for rigidly securing it. This condition often results in the tool digging into the commutator, and possibly doing even greater damage.

Considerable danger also exists from the end play of the armature running at slow speed, which causes the armature to oscillate in its bearings. When taking a cut with a tool under these conditions, the armature is liable to oscillate and the tool dig into the commutator, or result in even more serious damage.

The same danger is true of this method as is true of the truing in a lathe process—that of dragging copper from bar to bar, which results in a short circuit and perhaps the burning out of a coil. When truing a commutator it is necessary to shut down the generator or motor, or at least to run them very slowly.

But in the case of truing with a commutator truing device it is not necessary to remove the armature or to shut down the machine: it can go on delivering its full load, if necessary. The use of a truing device insures a better job done in less time and eliminates the waste of copper through taking large cuts.

When it becomes necessary to install a new set of brushes, sandpaper or garnet paper, long enough to go around a commutator, may be used. The paper should have a lap of several inches and be so mounted on the commutator as to preclude the probability of the lapped end butting against the brushes when the machine is rotated for grinding.

Friction Gripper

With many commutators the friction between the bars and the sandpaper—that is, if the paper is taut—will suffice to keep the paper from slipping, especially so if when starting the paper is given a pull in the direction of rotation. Should the paper persist in slipping, a little glue may be applied to stick the under end of the paper at the lap of the commutator; but all traces of glue must be removed from the bar before the machine is put into service.

Another Method

A second method is to remove the middle brush on each arm and bind the paper to the commutator by running friction tape or string entirely around the periphery. If necessary, the paper may also be bound at the inner and outer ends of the commutator. After the paper is anchored, the commutator may be rotated by hand, or in any way convenient. Great care must be exercised in grinding-in brushes in this way, as the cutting is very rapid, especially with soft brushes, and much of the life of the brush may be ground away in very few revolutions.

If, after the brushes have been surfaced in the above manner, the trailing edge shows a poor seat on account of having had to mount the ridge occasioned by the lap in the paper, a final surfacing should be done by hand with very fine sandpaper.

The foregoing method is particularly desirable when the machine has very hard brushes or a large number of soft brushes. After the knack of applying and anchoring the paper is mastered, this method is a great timesaver.

Fixed Contact

There are those who advocate and those who practice pulling the grinding paper in the direction of the rotation in order to more correctly surface the brush. This procedure seems logical enough on first thought, but inasmuch as the commutator is not in motion when the brushes are surfaced in this manner, there is no assurance that the brush will bear the same relation to its holder (and, therefore, to the commutator) when the commutator is rotating, and, consequently, no assurance that the contact will remain fixed. In this point probably lies the explanation why brushes frequently show perfect contact when idle, but poor contact when in service. This method of fitting the brushes is not, therefore, necessarily more dependable than other methods, although in some cases it can be recommended.

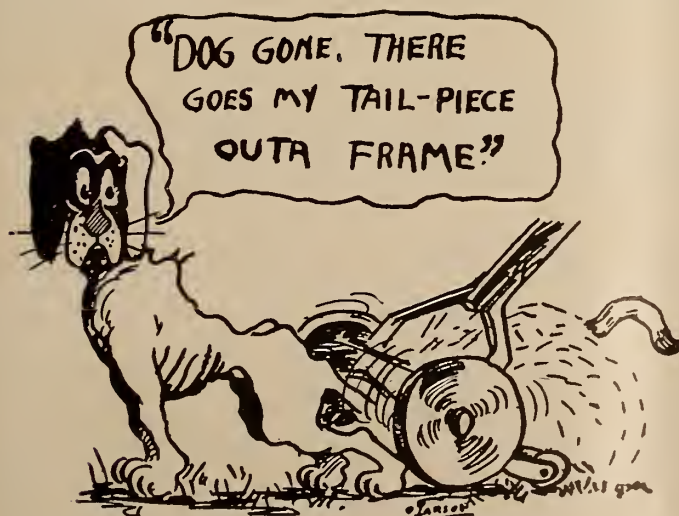
Proximity Important

It is important that the brush holders, irrespective of whether direct or alternating current be used, be neither too close nor too far from the commutator slip-rings. A suitable distance is from $3/16$ to $1/4$ of an inch, if the brushes are copper coated.

The coating should not be permitted to come in contact with the commutator, i.e., as the brushes wear, the copper coating should be scraped back and not be permitted to extend below the brush holder box.

Checking Brush Settings

To check the spacing of brushes, place a strip of paper completely around the commutator under the brushes and mark the position of each set. The strip can be removed and the distance between marks measured. If the distance varies, the brush holders should be moved into proper position.



Salve! Muybridge

EDITOR,
MOTION PICTURE PROJECTIONIST:

Sir: I wish to call your attention to an inaccuracy in your last issue in relation to the appearance therein of a picture of a running horse accompanying which was the caption, "Edison's first attempt to secure motion pictures."

Now, it is a matter of record that this feat was performed by none other than Eadweard Muybridge in the course of a series of experiments bearing on the analysis of human motion conducted by him in 1872-79 at Leland Stanford University, Palo Alto, California. To be exact, these experiments of Muybridge's were commenced at Sacramento, California, in May, 1872, and continued with numerous periods of intermission, at Palo Alto, in the same state, until 1879.

Whether Mr. Edison ever conducted any such experiment as is implied in your magazine is not within my memory, but I doubt it. I have no intent of precipitating a controversy or anything like that in this matter, but I feel that credit should be accorded where credit is due, and I am sure that in this you will agree with me.

AN OLD TIMER.

(Our regret at this unfortunate error is tempered somewhat by the pleasure of knowing that Mr. Muybridge has such a staunch admirer. Receipt of the above letter is welcomed not only because it places credit where it is due but also because it affords us an opportunity of announcing that the very interesting experiments of Eadweard Muybridge will be described in an article in an early issue—possibly the next.—THE EDITOR.)

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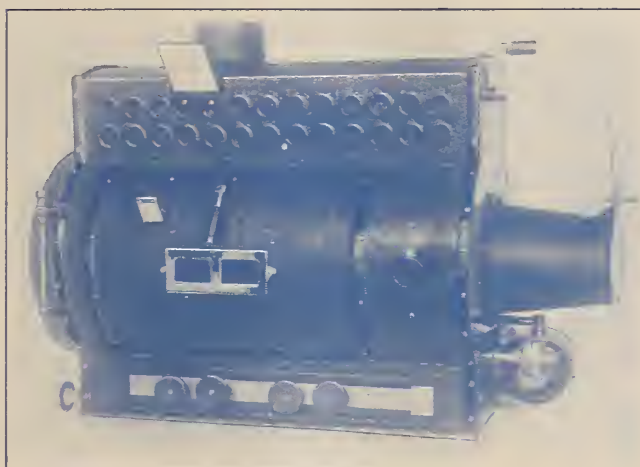
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IN an article in the Dec. 3 issue of *Motion Pictures Today*, the author, Mr. E. T. Keyser, lists a series of film-fires in each one of which the projectionist was severely burned. He concludes his editorial by saying:

"... It certainly constitutes something for the projectionist to think about when the boss asks him if he doesn't think it would be a good idea to install a Sentry Safety Control which renders such occurrences an impossibility."

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Letters From Readers

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MOTION PICTURE PROJECTIONIST:

In publishing the MOTION PICTURE PROJECTIONIST you have done the craft a great service; you are publishing a magazine that is a MAGAZINE. Every alert projectionist should make it his business to subscribe as a mark of appreciation for your service to the craft. It is difficult to describe in a letter how well your efforts are appreciated. Enclosed is my check for several more subscriptions.—WAYNE E. MICKELSON, Sec.-Treas., Local 628, Charleroi, Penn.

Continue Your Good Work

EDITOR,
MOTION PICTURE PROJECTIONIST:

I am enclosing herewith a check for one year's subscription for the following six men. I have a list of other members who have signified their desire to subscribe but who were not present today. I like your publication very well and hope you will continue in your good work.—GEORGE L. HENAULT, Secretary, Local 437, Brockton, Mass.

Just the Paper I'm Looking For

EDITOR,
MOTION PICTURE PROJECTIONIST:

I have just run across an issue of your magazine and it is just the paper I have been looking for—one that stands for progress and is exclusively devoted to projection and the projectionist. Enclosed find my subscription.—A. C. HARGRAVE, Walnut Park Theatre, Portland, Ore.

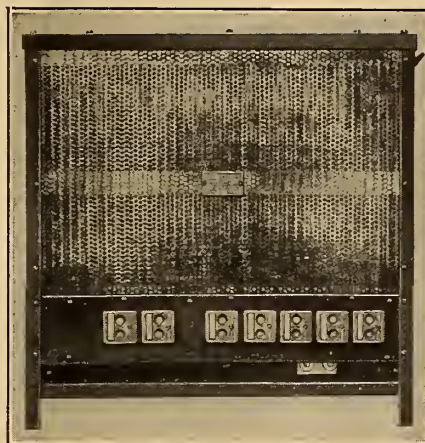
EDITOR,
MOTION PICTURE PROJECTIONIST:

I have just received your January issue and, after reading it from cover to cover, I wish to say that it is the finest craft paper I have ever read. I have been reading literature on projection for fourteen years, but your publication covers the field so well that that brooks no comparison with any other projection material. I shall give the PROJECTIONIST all the support I can.—CHARLES H. GRESTY, Sec.-Treas., Local 641, Arkansas City, Kansas.

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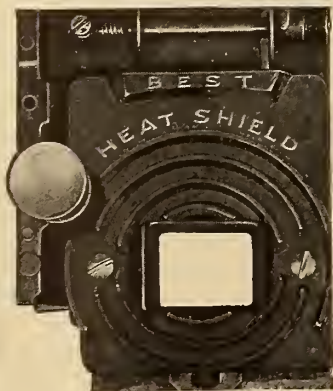
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Enclosed please find six additional subscriptions for the PROJECTIONIST. Kindly advise whether you are soon to raise the subscription price to \$2.50. The Brothers who are now receiving the magazine seem highly pleased with it and anticipate great things from it.—M. J. SANDS, Secretary, Local 150, Los Angeles, Calif.

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EDITOR,

MOTION PICTURE PROJECTIONIST:

I am enclosing six subscriptions for THE MOTION PICTURE PROJECTIONIST. The members were all very highly pleased with the first two issues, and think the magazine's well worth the price. Best wishes. HAROLD HARVEY, Sec.-Treas., Local 588, Muskegon, Mich.

This Local 100 Per Cent

EDITOR,

MOTION PICTURE PROJECTIONIST:

Enclosed please find ten (10) subscriptions for the PROJECTIONIST, making twenty-five in all that I have sent you, which practically makes 100 per cent from this Local. Lots of success.—HENRY W. LEGEYT, Secretary, Local 486, Hartford, Conn.

EDITOR,

MOTION PICTURE PROJECTIONIST:

The PROJECTIONIST is just what the craft has needed for a long time, and I am boosting it to all my brother projectionists.—N. J. LINK, Minneapolis, Minn.

EDITOR,

MOTION PICTURE PROJECTIONIST:

Enclosed you will find a list of names of those who wish to subscribe for your paper. I would like to say that this magazine is just what a lot of fellows here wanted, and this Local endorses it to the limit.—R. B. ALSTON, Secretary, Local 227, Ponca City, Oklahoma.

EDITOR,

MOTION PICTURE PROJECTIONIST:

All the boys here in the Local who receive your magazine think it very fine, and I myself think it is a wonderful paper for the boys.—LESLIE YATES, Secretary, Local 597, Waco, Texas.

THE MOTION PICTURE PROJECTIONIST

A Magazine Devoted to Projection and Projectionists

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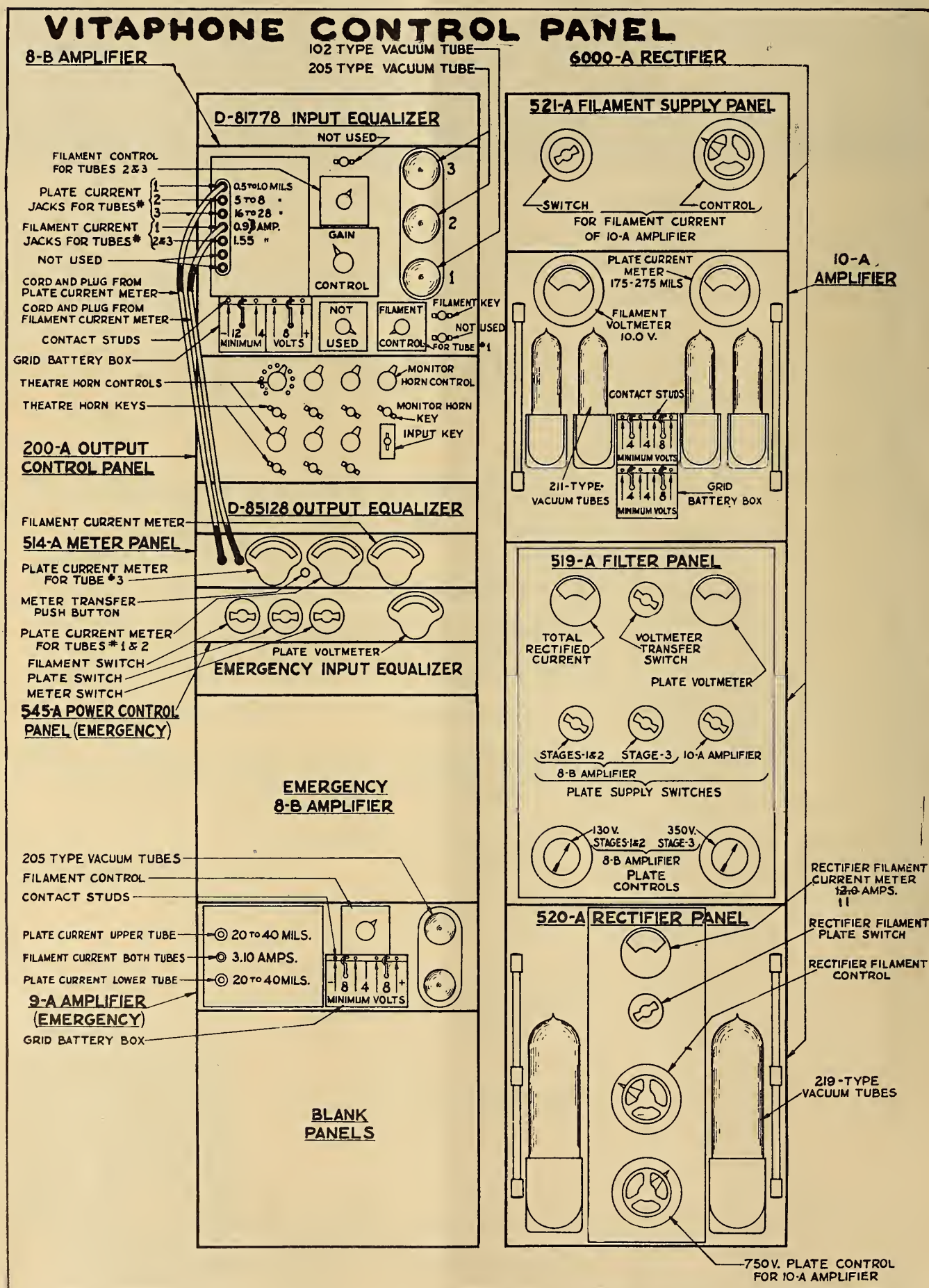
Letter from Chicago Local

Special Blue Print Insert

Stunts

Letters from Readers

Note:—The Motion Picture Projectionist does not assume responsibility for the statements and opinions appearing in signed articles in its columns. The leading experts in each phase of projection are asked to contribute and they are free to express their own theories and experiences. Accuracy alone is insisted upon.



This panel published again at the special request of 937 new subscribers who subscribed after the February Number was issued

Vitaphone: System "B"

By J. J. KIELEY & M. W. COPELAND

SINCE we started our last article the Western Electric Company has discontinued manufacturing the amplifier we are describing, but inasmuch as there are quite a few of these amplifiers already installed in theatres throughout the country, we feel it quite necessary to continue, so that you may be familiar with all systems.

The Western Electric Company has placed on the market another amplifying system which is very much simpler in design and operation; this does not, however, change the fundamental operation of either "Vitaphone" or "Movietone." We will, in a later issue, describe this latest system and other systems which are now being readied for the market.

The "B" equipment has two amplifying systems: one regular and one emergency.

The regular equipment has an input equalizer, 8-B amplifier, 10-A amplifier, and 6000-A rectifier; the emergency has an input equalizer, 8-B amplifier, 9-A amplifier, and the "B" battery. The same "A" batteries and battery switching and charging and volume control panels are used for both systems.

The equipment is made up of several complete units mounted on separate panels; the panels are in turn mounted on a large upright metal frame in a compact manner to permit quick and easy adjustment of the various circuits; also, that the operator may see at a glance the conditions of each circuit.

The first duty of the Projectionist is to go to the battery Switching and Charging Panel.

Fig. 9 shows the essential features of the battery switching and charging panel. This panel is mounted in a steel cabinet on the wall.

As this installation operates on AC supply, which cannot be used for battery charging, it is necessary to rectify this current—that is, turn it into DC. This is accomplished by the charger which is mounted on top of the cabinet.

The charging current for all the batteries enters the battery switching and charging panel through a single-line switch. It then passes to the charger. The left-hand switch on the front of this apparatus is marked "A" and starts up the section used for charging the "A" and "H" batteries. The switch on the right is marked "B" and starts up the part used for charging the "B" battery. The knob on the right is the "A" and "H" battery charging current control, which is used to regulate the rate at which these batteries are charged. The charging current through the "A" and "H" batteries is indicated by the meter at the bottom left-hand corner of the battery switching and charging panel. The batteries are so connected that the charging current through each individual unit is half the meter reading.

Each of the two groups of "A" batteries is controlled by a switch that connects the group for charging or for operating, according to whether it is set at "CH" or "OP." The current from whichever group of "A" batteries is operating leaves the panel through the filament supply switch.

The switching arrangements for the horn batteries are

the same as for the filament batteries. The current from whichever group of "H" batteries is operating passes through a horn current control mounted near the panel. The current then leaves the panel through the horn supply switch.

Where necessary, a compensating resistance mounted near the panel is used to make the discharge rate of the horn and filament batteries the same. This is a fixed resistance which will not need your attention.

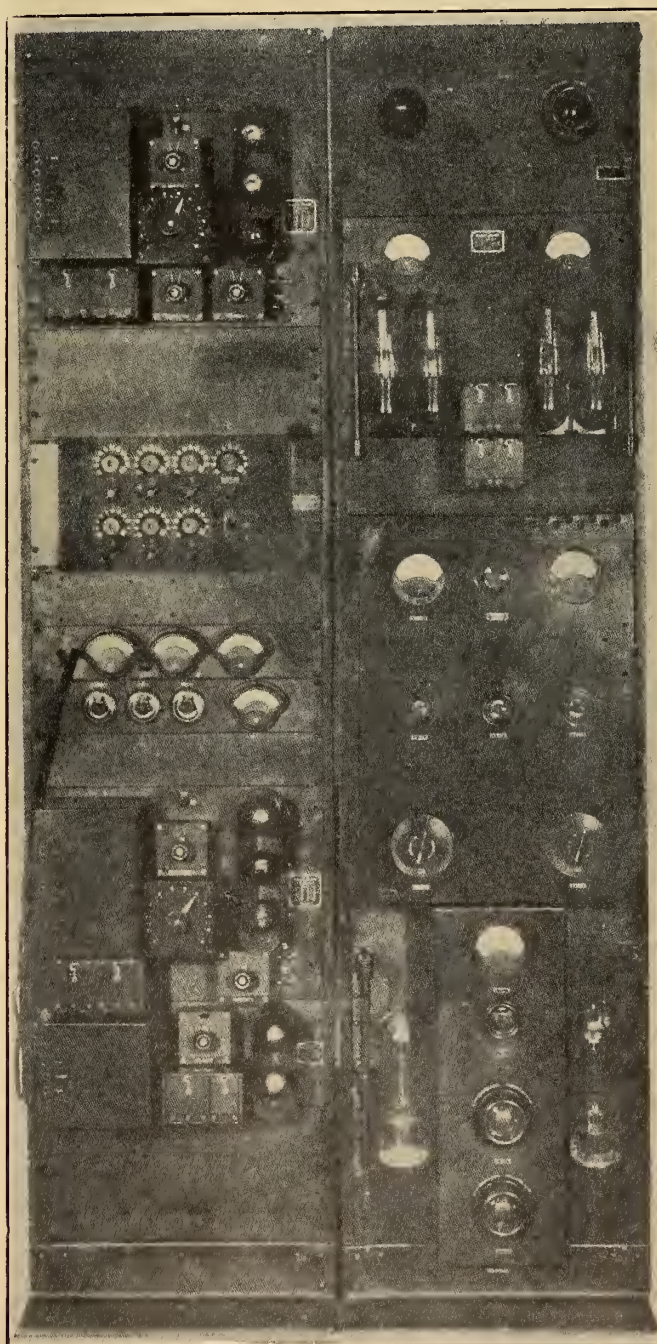
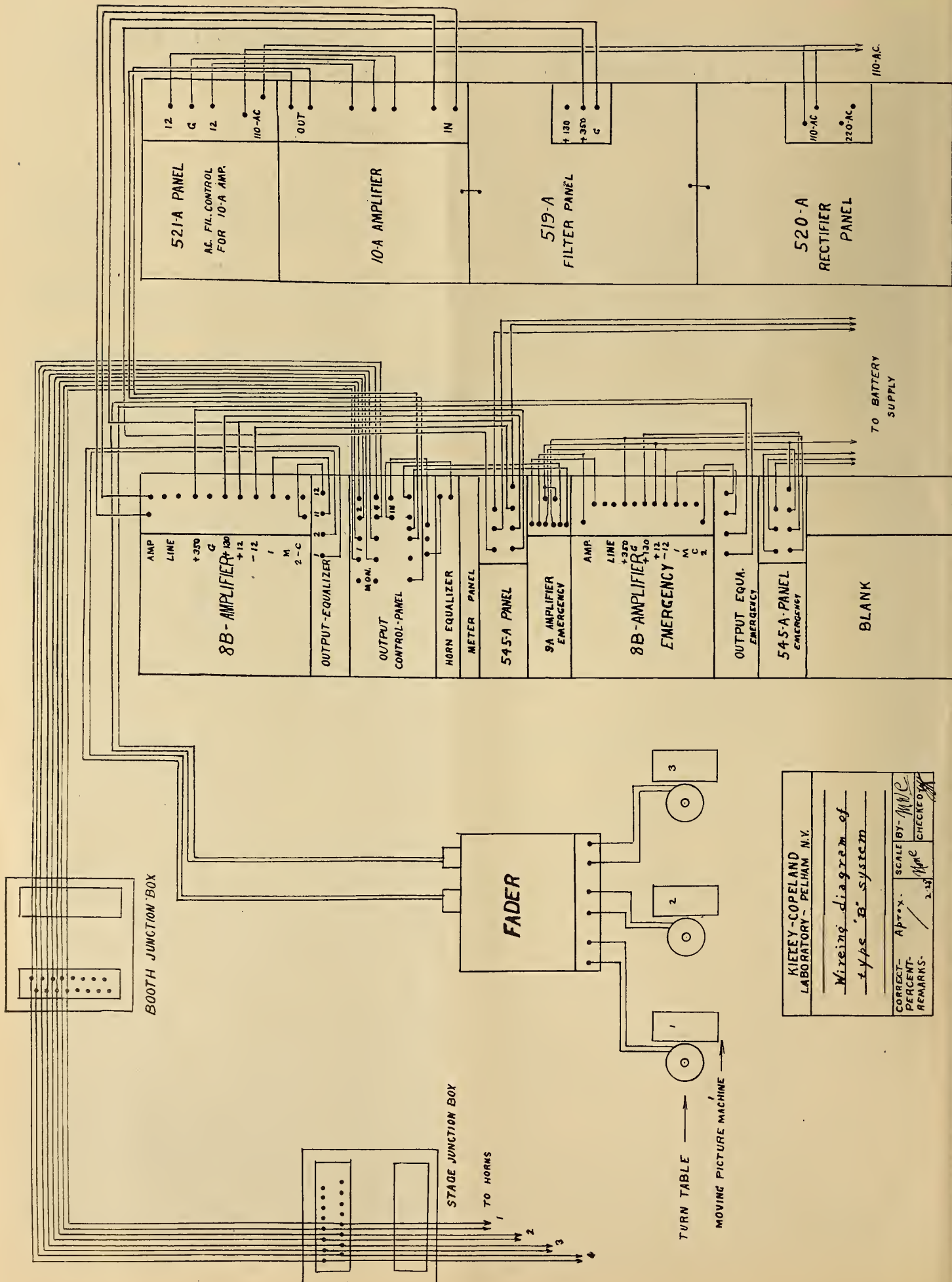


Fig. 1.—Type "B" equipment



| | |
|--|-----------------|
| KIEEY-COPELAND LABORATORY - PELHAM N.Y. | |
| Wiring diagram of type "B" system | |
| CORRECT- PERCENT- | SCALE BY- MNC |
| REMARKS- | CHECKED BY- MNC |
| | 2.13 |

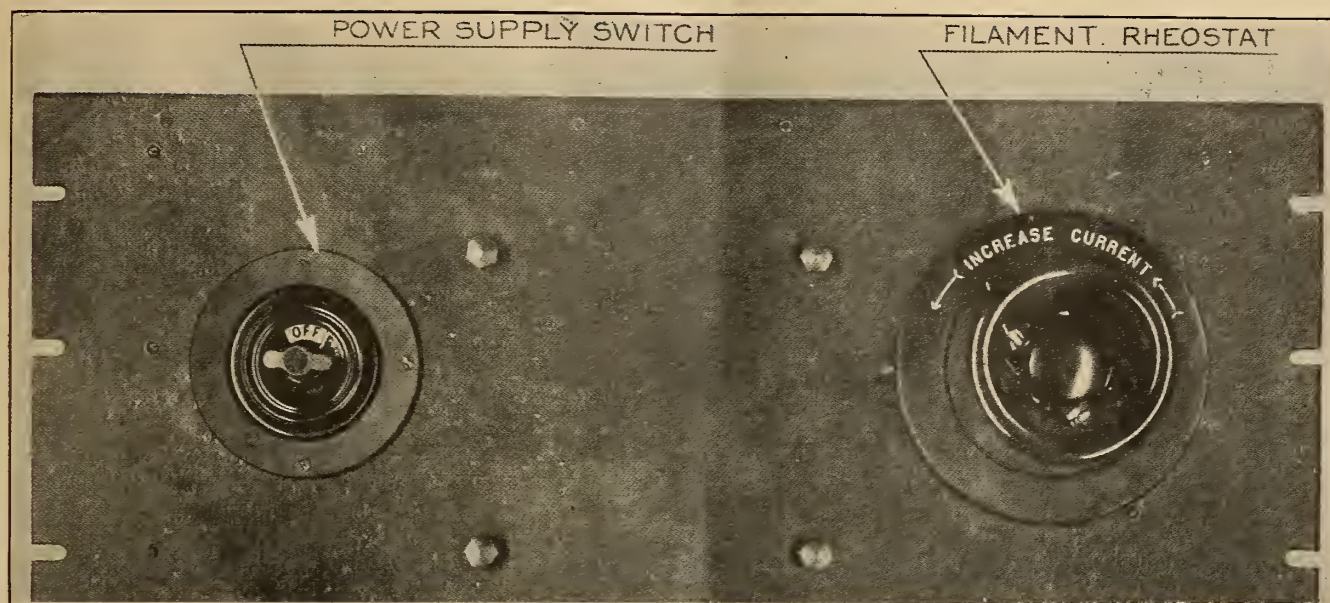


Fig. 2. 521-A panel

The wiring is so arranged that in order to charge one of the "A" battery sets, one of the "H" sets must be charged at the same time, and vice versa.

The "B" battery charging current from the charger enters the panel through the "B" battery charging switch in the upper right-hand part of the panel.

The fifteen "B" battery units are divided into five groups of three each, which are charged in parallel and operated in series. Their arrangement in this respect is governed by the five "B" battery control switches in the upper left part of the panel. Five 100-watt 110-volt lamps used as resistances to limit the charging current to the correct value are inserted in sockets beside these switches.

The current from the "B" batteries leaves the panel through the plate supply switch located at the upper right corner.

The line switch, the filament supply switch, and the horn supply switch on this panel are each provided with two 20-ampere cartridge fuses. The "B" battery charging switch has three 6-ampere fuses. The plate supply switch has four 3-ampere fuses. The charger has two 15-ampere plug fuses inside the case. It uses three rectifier bulbs.

The next step is to go to the 521-A panel and turn switch marked "FIL" to "ON" position as shown in Fig. 2.

The next step is to light the filaments of the tubes of the 520-A rectifier panel which is shown in Fig. 3. It must be noted here that this switch has three positions, marked as follows: "OFF," "FIL," "PLATE." Be sure to turn switch to "FIL" position; do not turn to "PLATE" position until the tubes are warmed up; be sure to adjust the filament control on the 521-A panel to proper current values as instructed.

While the rectifier and the 10-A amplifier tubes are warming up, light the filaments of the 8-B amplifier; this is done by closing the filament switch on the 545-A panel, then the switch on the 8-B amplifier panel (see Fig. 4); then take the smaller of the two plugs connected to the meter panel (as shown in Fig. 5) and adjust the current flowing in the filaments by means of the two rheostats (as shown in Fig. 4), to values as shown on chart. Before applying the plate voltages to the vacuum tubes, turn the snap switches marked 120, 350 and 750 to "ON" position and the voltmeter transfer switch to the "1200" scale position, as shown in Fig. 6. Next, turn the snap

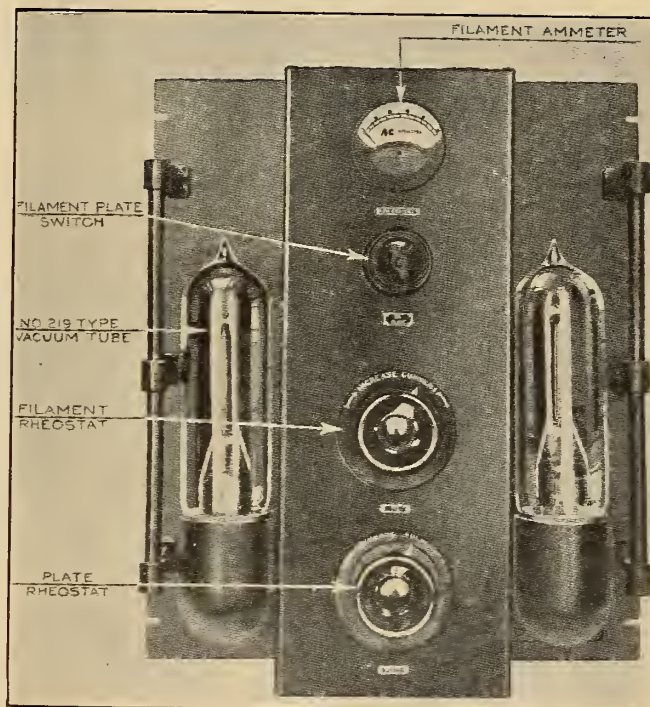


Fig. 3. 520-A panel

switch on the rectifier to the position marked "PLATE"; you have now applied the plate voltage to all tubes of the 8-B and 10-A amplifiers. After this is done, the filament current reading of the A. C. ammeter, as shown in Fig. 3, and the voltage readings of the A. C. "FIL" voltmeter, as shown in Fig. 7, should be checked and readjusted, if necessary, to conform with chart. (Instructions posted on each job). By means of the rheostat, as shown in Fig. 2, adjust the plate voltage of the 10-A amplifier to 750 volts on the "1200" scale setting of the voltmeter (see Fig. 6). The voltmeter "transfer switch" (see Fig. 6) should then be turned to the "600" position and the voltage adjusted to 350 volts by means of the rheostat marked "350". Again turn the voltmeter "transfer switch" to the "300" position, and by means of the rheostat marked "130" adjust the voltage to 130 volts; now once more check these voltages; the reason for this is that all three circuits are supplied

NOTE:—The horns are
Now being mounted in
back of the screen

UPPER
HORNS

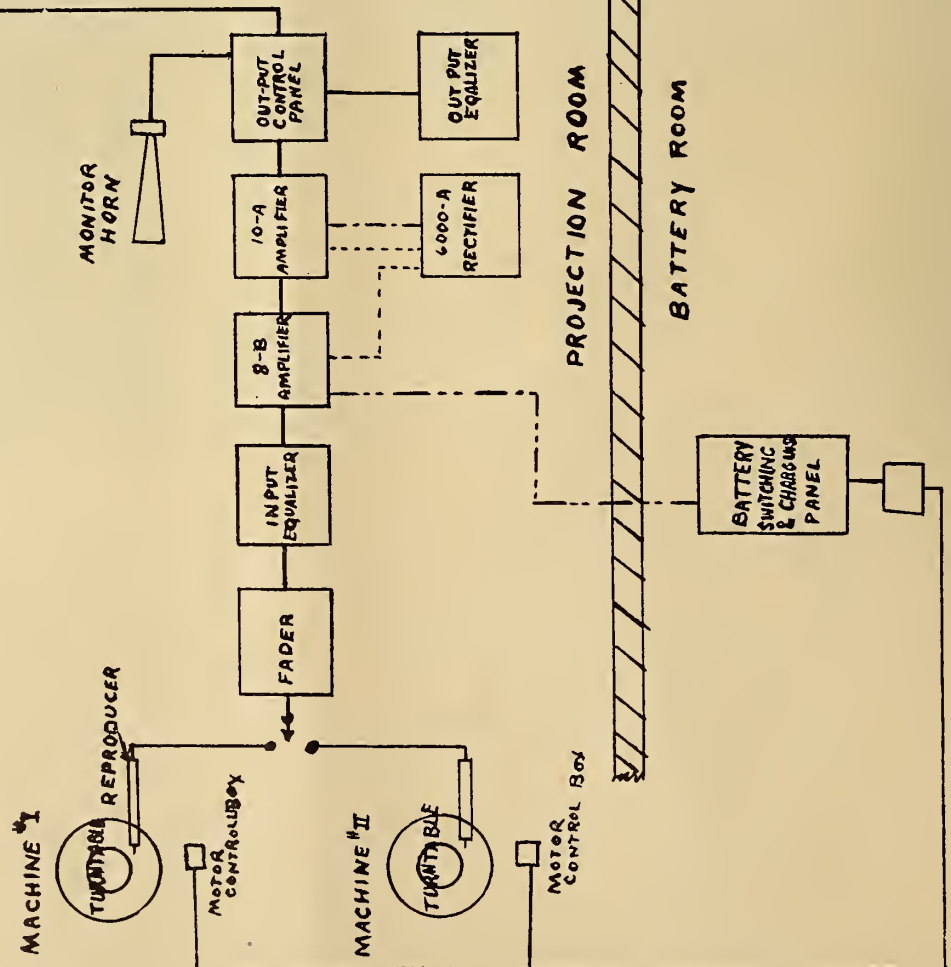
SCREEN

LOWER
HORNS

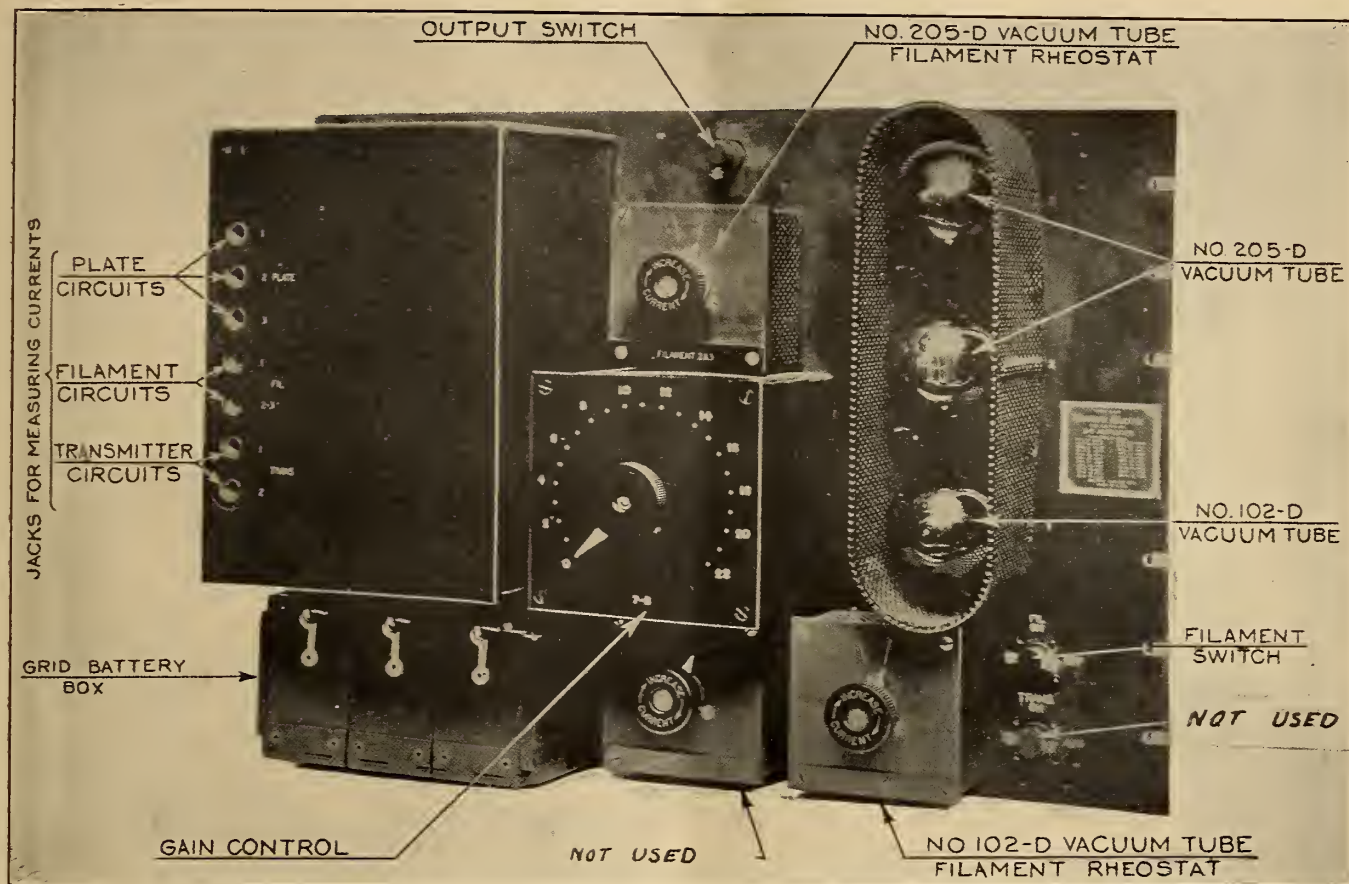
SIMPLE DIAGRAM
OF
WESTERN ELECTRIC SOUND
PROJECTOR SYSTEM
(NOT TO SCALE)
Without Emergency System

THEATRE

KEY
—— CURRENT CARRYING—SPEECH OR MUSIC
- - - - A.C. FILAMENT
- - - - PLATE CURRENT
- - - - A.C. SUPPLY
- - - - D.C. FILAMENT

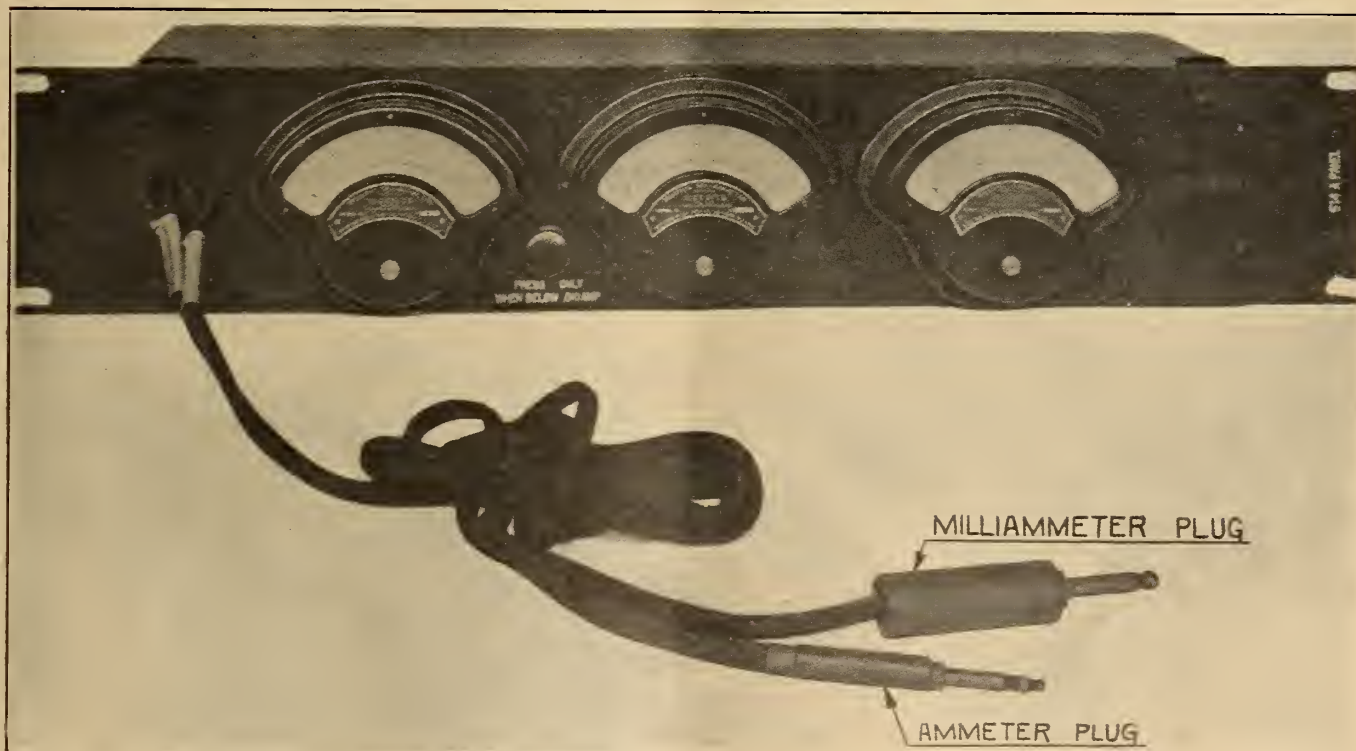


To A.C. Supply 110 Volts



Above: Fig. 4. 8-B amplifier

Below: Fig. 5. 514-A meter panel



from the same source and when one circuit is adjusted there is a tendency to unbalance the other two. It is very important that these voltages be absolutely correct before going any further. After the plate voltages have been checked, as just described, the plate currents in the 8-B amplifier should be measured as follows: Take the large plug connected to the meter panel, take readings

of the plate current of the 102-D tube by inserting the plug in the jack marked "PLATE" and pushing the button provided on the meter panel to connect the .010 ammeter in circuit. The plug should then be inserted into the jacks marked "PLATE 2" and "PLATE 3" to measure the plate currents in the No. 205-D tubes. The currents in each case should fall within the limits given in

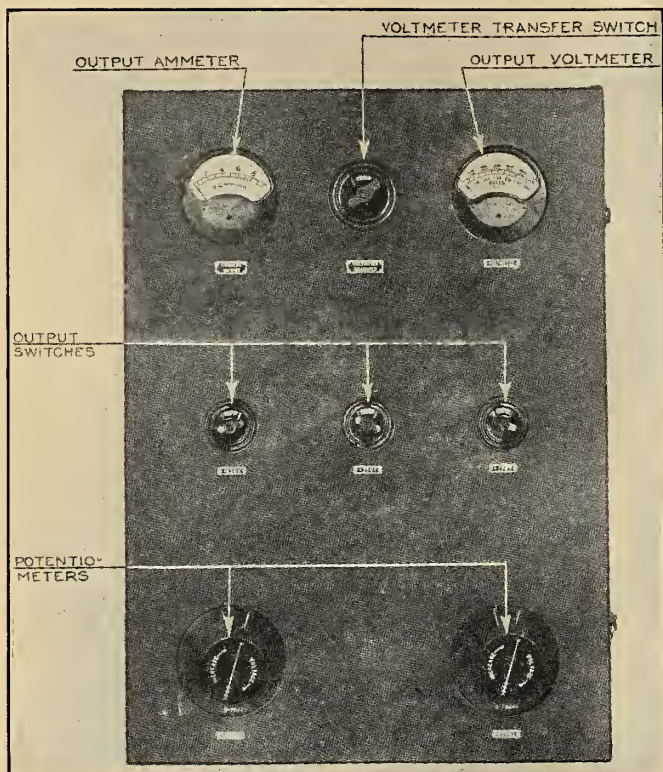


Fig. 6. 519-A panel

chart. The milliammeter (as shown in Fig. 7) indicates the total plate current of the tubes in this amplifier.

After starting the amplifier, as previously described, make the following tests every day before the house opens: Testing the horn individually, on the output control panel, turn off all of the individual horns, set all controls at zero, that is, turn all the way to the right, keep on monitoring horns with control at usual setting. Put input key at regular marked (R), set pointer on (Fader) on zero, and put output key at (R).

You are now ready to put a test record on each turntable for a trial run. (No film is used while making these tests; note:—use two records alike.) Hold record with both hands and lay same on turntable. Put in new needle in reproducer. After needle is inserted, pick up forward end of reproducer unit between the thumb and forefinger of your left hand, so that the tips of your thumb and finger project about half-way below the bottom of the unit. Move pointer unit over to a point where needle is over starting groove. Place your right hand with your finger resting lightly on under side of turntable near edge and thumb on top of record near edge. Hold turntable steady and by moving thumb turn record so that starting arrow comes below needle point. Lower needle down gently into starting groove; then put record clamp on center pin.

In each motor control box see that speed control indicator is set on mark corresponding to speed of synchronized subject. (See Fig. 12)

Start projector by means of starting switch on motor control box. After motor is up to speed, see that the reproducer is tracking properly on record. Put "Fader" pointer to correct setting for record which is being played. Music should now be heard from monitoring horn. Go to the output control panel and turn on theatre horns one at a time, by means of horn keys. Someone should be detailed near the stage when making this test to listen to each horn and check same, also being sure that the sound is clear and that full volume is being obtained. Now start second machine in the same manner as has

just been described. If the above test is found satisfactory, then test emergency equipment in the same manner. Everything being found satisfactory, switch back to regular system. You are now ready to start the show.

Set "Fader" at zero. See that reproducer is in its rest. Put in new needle, select film and record to be used, and be sure to check number on record against number on film. Place framing level in center position; move projector mechanism by turning flywheel on motor, so that the shutter cut-off blade is in the uppermost position, leaving lens open. Then thread projector with film in the usual manner, placing frame mark "Start" directly in front of the aperture, being sure that record on turntable is set with reproducer needle at starting point, as indicated by arrow.

One of the most important considerations in connection with the operation of this system is the first step, that is, getting the film and record started at the proper places. If this is not done the record and the film will not be in synchronism (the music may be ahead of the moving picture film, or the moving picture film may be ahead of the music). This has the effect of someone stuttering. When the person you are talking to tries to pronounce a word, his mouth starts to move; you naturally expect to hear something, but nothing comes out, and there you stand. You feel sorry for the fellow and almost try to help him. This naturally sets you on edge. Now you can readily see what it means to one watching a moving picture that is out of step with the music or speech (we cannot stress this point too strongly); there will be a time difference between the action appearing on the screen and the sound accompanying it. The starting frame on the film is marked "START NO.", the designating number of the film being indicated.

The starting mark on the record is the beginning of the first groove near the center of the record and is indicated by an arrow (the Vitaphone records are played from the center to the outside; the standard commercial record is played from the outside in, or just opposite). A new needle should be used for each record, or each time the record is played, placing the needle point exactly opposite the arrow marked on the record indicating the starting point; this should be done before the motor is started. With the "Fader" set on zero position and all circuits connected for normal operation, with the film and record properly set, it is now only necessary to operate the switch on the motor control box in order to start the show.

During operation, the motor and other rotating parts

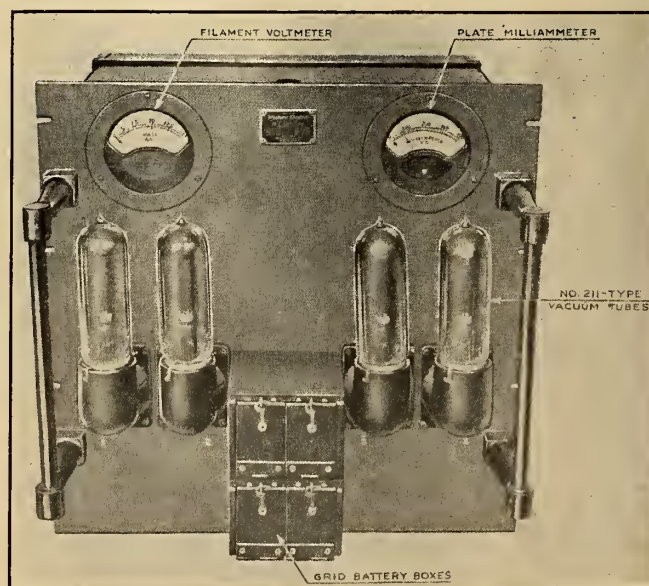


Fig. 7. 10-A amplifier

will under ordinary conditions require no attention or observation. The operator should check the reading of the milliammeter located on the motor control box now and then to see that the current in the regulating field of the motor remains within the proper limits; a failure of the control circuits to function properly is unlikely, but should it occur it will manifest itself by a change in pitch of the reproduced sound. The most useful means of judging the operation of the system is the use of the monitoring receiver (loud speaker) mounted in the operator's room to enable him to hear the reproduced sound.

The motor used for driving the projector and the turntable is designed to operate on 110 volts (commercial circuit) and is provided with a special circuit by means of which the speed of the machine is maintained at 1200 R. P. M. This equipment is mounted on a substantial base supported on three telescoping legs by means of which its height may be adjusted. The control circuit is contained in a steel box and set just below the projector and is connected to the motor by a multi-conductor cable encased in greenfield conduit. A special 1/5 H. P. shunt or repulsion type motor is furnished together with its control circuit, according to whether the power supply is normal 110 volts DC or AC.

The Projector Driving Mechanism consists of a drive or gear box mounted on the same base as the motor and is coupled directly to the shaft of the motor; a vertical extendable shaft equipped with universal joints and also a second drive, which is a bevel gear box and which replaces the speed regulator of the projection machine. By means of these two sets of gears the speed is reduced from a motor speed of 1200 R. P. M. to a speed on the projection machine shaft of 90 R. P. M., which corresponds to a film speed of 90 feet per minute.

On the opposite end of the motor from the projector driving mechanism is the turntable equipment. The turntable mechanism is mounted on a heavy telescoping pedestal base, the three supporting legs of which are provided with adjusting screws so that it may be leveled. A worm gear mechanism is housed in a casing in top of the pedestal. The shaft of the worm projects outward

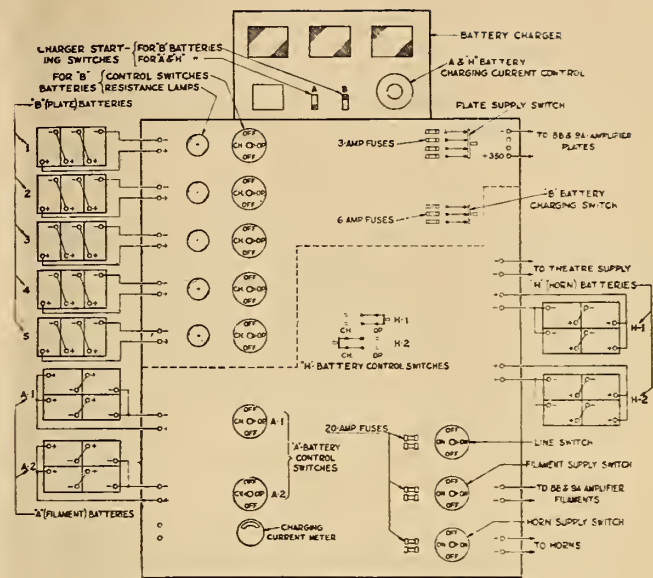


FIGURE 9
BATTERY SWITCHING AND CHARGING PANEL FOR
A.C. SUPPLY

and is connected to the driving motor shaft through a flexible coupling designed to prevent the transmission of vibrations from the motor to the turntable. The gear wheel which meshes with the worm carries a vertical shaft on which the turntable disc is mounted. Between the gearwheel and the vertical shaft of the turntable is a mechanical filter or "shock-absorber" consisting of light springs designed to prevent the transmission of gear noises from the worm gear to the turntable and thence to the record and reproducer. The worm gear ratio is such as to reduce the speed from 1200 R. P. M. to $33\frac{1}{3}$ R. P. M., which is the correct turntable speed.

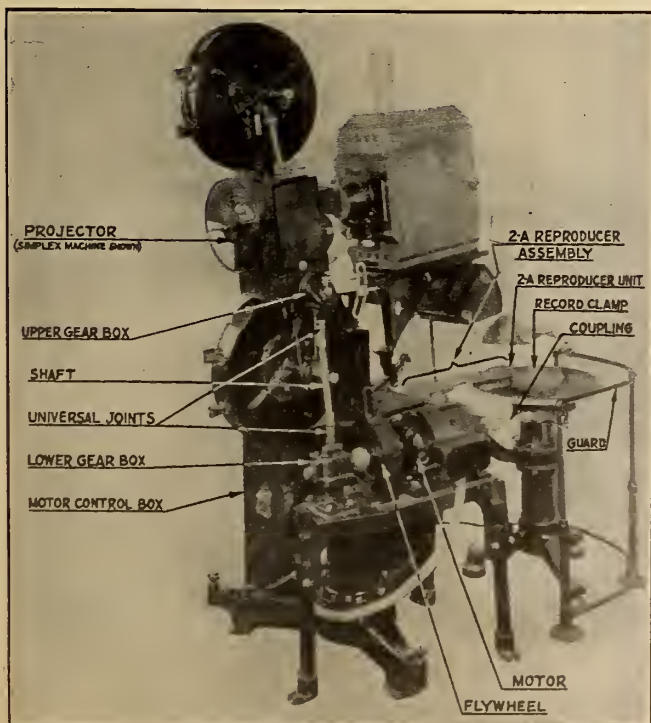
The turntable is designed to accommodate 16-inch records and has a clamping device to hold the record firmly against its surface; a guard is provided to protect the rotating parts.

The reproducer consists of a needle holder attached to a small armature which is balanced on knife edges in an air-gap between the poles of a permanent magnet. This reproducer is enclosed in a metal housing which is attached to one end of the reproducer mounting. The other end of the mounting is supported in such a manner that it is free to swing in a horizontal plane as the reproducer travels from the inner to the outer edge of the record (the reproducer swings in exactly the same manner that your phonograph tone arm swings). The wires which form the electrical connection to the reproducer are brought out at the rear of the reproducer mounting where connection is made through a connecting block to the input circuit of the amplifying equipment.

The function of the Amplifying equipment is to increase the weak vibratory currents produced or generated by the reproducer to a point where they have sufficient strength to produce the required volume of sound when converted into sound waves by the loud speaker units. (This equipment operates just like the audio amplifier on your radio).

The 514-A Meter panel is used to measure filament and plate currents flowing in the vacuum tube circuits of the amplifiers, and should be used according to instructions given with the apparatus.

The 8-B Amplifier is a three-stage amplifier; the first stage consists of one vacuum tube No. 102-D; the second and third stages use two vacuum tubes No. 205-D; the filaments of these two tubes are connected in series.



Showing turntable equipment connecting shaft, motors, etc.

The 10-A amplifier receives its input energy from the 8-B amplifier and consists of a single stage of amplification using four No. 211-E vacuum tubes in parallel "push-pull" arrangement; there is no means on this amplifier to regulate the out-put.

The "Volume Control" apparatus located on the 200-A panel permits the regulation of the amount of energy supplied to each group of loud speaking units so that it may give the proper sound in relation to the other groups. (The sound volume as a whole is regulated by the Gain-Control mounted on the 8-B amplifier panel).

The function of the power apparatus is to supply the low voltage current for heating the filaments of the vacuum tubes used in the system and the high voltage current for the plates. Storage batteries are used to supply the power for the filaments of the vacuum tubes of the 8-B amplifier, also the magnetizing current for the loud speaking units. The 6000-A rectifier which operates on 110 or 220 volts, 60 cycle A. C. power supplies the power for the filaments of the 10-A Amplifier and also the plate potential for both the 8-B and the 10-A Amplifiers. If the equipment is to be used in locations where A. C. power is not available, a rotary converter may be used to supply the A. C. power for operating the 6000-A Rectifier.

The 6000-A Rectifier consists of three units, as follows: one A. C. filament supply panel (see Fig. 2); one rectifier panel (see Fig. 3), and one potentiometer panel (see Fig. 6). These units are designed to work together.

The A. C. filament supply panel reduces the voltage of the 60 cycle alternating current to proper values for use on the filament circuits of the 10-A amplifier. Also the rectifier panel supplies both low and high voltages, the low voltage being used for the filaments of the rectifier tubes and the high voltage (2200 volts) for the plates of these tubes, 1100 volts passing through each vacuum tube where it is rectified (changed to D. C. current). The rectified current as it comes from the rectifier tubes is passed through a filter and potentiometer panel where the filter removes the fluctuations. Two potentiometers are mounted on this panel and they are used to regulate the 350 and 130 volts supplied to the 8-B

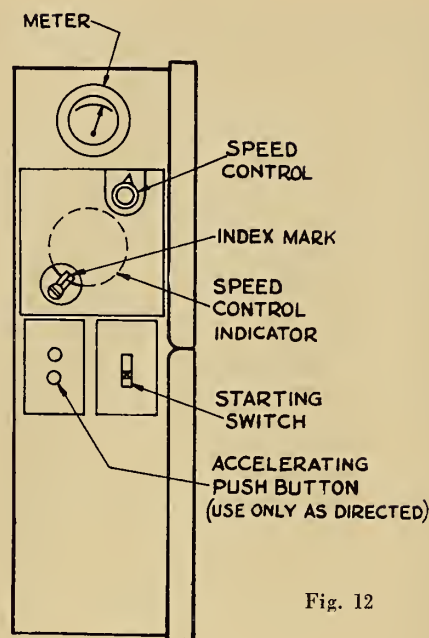


Fig. 12

amplifier. The rectified and filtered current is also supplied to the 10-A amplifier at about 750 volts; the main portion of the output from the rectifier is used by the plate circuit of the amplifier (see Fig. 7).

The voltage in the 6000-A rectifier is therefore dangerous; the panels are so designed that the apparatus on which this voltage occurs are carefully protected; when the covers are removed the automatic cut-off switches dis-

connect the high voltage from the system.

The high voltage circuit in the 10-A amplifier under the panel cover is also provided with a safety switch to protect the operator.

The motor generator is a two-unit, direct connected set consisting of a D. C. motor driving a single-phase alternator. The control panel is mounted on the set. On the panel is mounted a voltmeter, a generator field rheostat for controlling the voltage and fuses for both the generator and the motor circuits. There is also a starting mechanism designed to start the motor when the switch is turned to the "ON" position and to stop the motor when turned to the "OFF" position. The motor generator set is required only when the local power supply is D. C. Most operators being familiar with this kind of equipment, we feel it unnecessary to go into further detail.

(Continued on page 22)

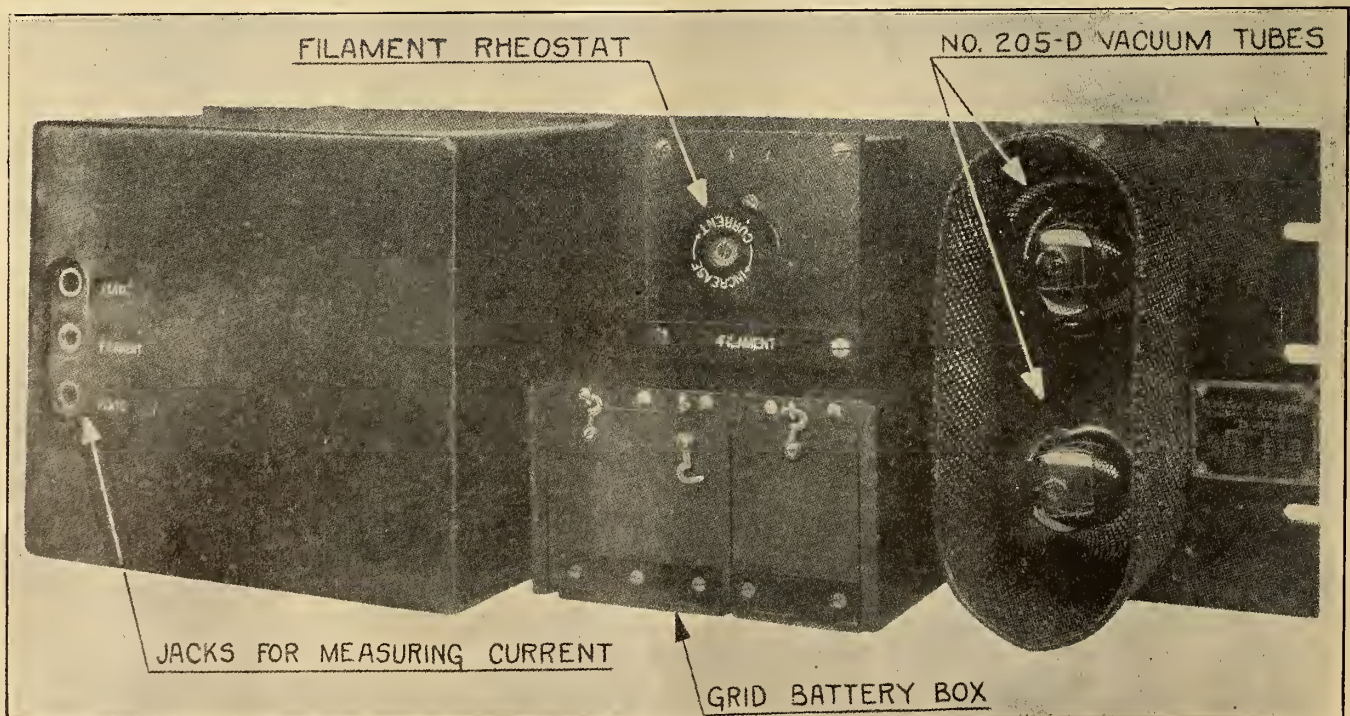


Fig. 10. No. 9-A amplifier

CHICAGO

and Other Cities

When one visits Chicago one understands how it was possible for the Projectionists there to darken the screens of the city and keep them dark until the theatremen came to terms.

That event will long be remembered as the most audacious and the most courageous in the history of the labor movement of this country. The deadlock itself was not unusual—the tide of battle between labor and employers is still surging strongly but the complete control of the situation exercised by the Chicago Local leaders, their admirable restraint while drama heaved and rumbled all around them, the supreme unity exhibited by the membership, the masterly direction to a successful end—these things focused the attention of the whole world on the Windy City. The end of the controversy caused everybody to breathe a sigh of relief. Life and gaiety once more sprang up on hundreds of Chicago's screens. The controversy was a local one. But organized labor all over the country benefited. Courage sprang up in little, out-of-the-way places; pride in such an achievement gave renewed life to projectionists everywhere.

Chicago is organized one hundred per cent. It took years to accomplish it. The recent victory was the reward of such years of hard organizing, fighting, educating, building. Today the Chicago organization is as compact and as efficient as any highly organized commercial enterprise. A visit to its headquarters reveals well-laid out offices, neatly furnished; business is carried out with exactness and promptness; there is a quick response to all immediate business, altogether a smooth running, well geared routine manned by expert and confident officials. It differs only in one respect from a successful business organization—it has a soul—the soul of organized labor which has carried on through adversity and through success, its head always sane and level, its eyes gleaming with youth, its heart constantly loyal to a faith and to an ideal.

Thomas Maloy, if you insist on standing on your dignity, but Tommy Maloy to his hundreds of friends and admirers all over the country is the presiding genius of Chicago projection affairs. His voice is sure, his decisions instantaneous and unfailingly right and for the good of the Local. His personality dominates the Local as his personality dominated the historic Chicago controversy. He is ably seconded by his lieutenants.

Power. Confidence. Organization. Leadership. Loyalty. These and others are some of the outstanding qualities which the Chicago Local exhibits at once even to the most casual observer. Like Local 306, of New York, it is the highest point in labor organization. Both are solidly built and you can no more ignore them than you can a towering mountain in your path.

Milwaukee

For those seeking a quiet rest away from the hurly-burly of the big cities and yet not wishing to lose the big-city feeling we recommend a visit to Milwaukee. The people are gentle and courteous, life and business moves on without halt but noiselessly. A fine group of theatres line the main thoroughfare and although it was not our fortune to meet the officials of the Local we did see examples of excellent projection on the screens. John Black, who is now Business Manager of the Local, and also chief projectionist of the Midwesco theatres, is a quiet, efficient man to whom the equipment in his booth at the

Miller theatre seem second nature, so easily and confidently did he move among them and operate them for a combination vaudeville-picture show. Milwaukee has not yet subscribed 100 per cent to this paper but Projectionist Black is confident it will not be long before we will be able to report on these same pages that it has. Milwaukee is another completely organized city—another tribute to the ability of projectionists to meet and work for the common good.

Detroit

Those of you who have not met Max Rubin of the Detroit Local have a treat in store for them at some time. A young, very aggressive man, very capable, he has steered his Local through many a tight place to a successful end. He has organized Detroit 100 per cent and rules smoothly and efficiently. He is also a student of the labor movement and even a better student of human nature. It is my guess that it is the latter quality of being able to plumb the real thoughts and wishes of those he meets in controversy which has enabled him to win out so unfailingly. They give the same impression as those at Chicago—a business office, run along business lines. Ray Gagnon, the president is a likeable man, a real leader and worker and he and Rubin, along with the other officials, have made the Detroit Local one of the most important units in the I. A. Talk to a Detroit Local member and he will talk of nothing but Rubin.

I am not very familiar with the systems employed in other Locals, but in Detroit Rubin has evolved such a perfect mechanism that the files will tell you at any time the history of any theatre in the Detroit territory. What members worked there, how long they worked there, rates of pay, what difficulties they had, etc.—a complete record that glares at any theatre owner whose memory may be faulty. That gives you an inkling as to the type of man Rubin is and why he is such a success and so much beloved by the members.

Toledo

I was rather at a disadvantage in Toledo as I could only spend one day there but I did meet Charles L. Ripley, the young B. A. who keeps Toledo in a strong grasp, completely organized. I failed to meet the other officers, but in Detroit at the Convention the boys from Toledo will be my first port of call. Ripley was another one of that band of young men I met wherever I went, who were in control. Is it any wonder that the Projectionists form one of the best organized crafts in the A.F.J. of L.?

Cleveland

And when you are in Detroit for the Convention be sure you seek out Victor Wellman, Secretary and Harland Holmden, B. A. of Cleveland. You will leave Detroit feeling that your trip was worth while on that score alone. Wellman radiates the most consistent good fellowship. Should you ever visit the Cleveland offices in the Finance Building you will be as much at home as in your own office. Somehow Wellman represents the real brotherhood, which labor symbolizes.

Holmden is a diplomat. When you've said that, you have summed up the man who runs the Cleveland Local so brilliantly. Never a fuss or flurry did I detect in his manner or in his speech. He has a confident air, a calmness which instantly places him at an advantage over all others.

PROJECTION

"On the Level"

By LESTER B. ISAAC

Supervisor of Projection, Loew Theatres, Inc.



Lester
B.
Isaac

IF you should be consulted on plans for a new theatre (and many projectionists often are) notice where the projection suite is located and then sit back and figure for a while—"where that projection room is set, is it going to permit the very best projection results?"

Perhaps you may think that the architect ought to know where things belong and is being paid to know, just as, later on, you will be paid for what you know about projection. But this is not the right attitude to adopt on the matter, a matter in which you should be intensely and actively interested, for the location of the projection room is going to be a big factor in the type of work you are able to produce later on.

It isn't necessary to be technical about the matter; a good example of the evils of improper location of a projection room can be had at a trifling expense. As projectionists we know many houses where the front seats are usually the last to be filled, and we do not have to study any technical treatises to know the reason for this. Many people who occupy these front seats for only one show often complain about eyestrain after watching a fairly long feature.

From this part of the house the picture is distorted—the people don't look at all natural—gangling misshapen beings cavort across the screen. Even though this distortion is minimized when the picture is viewed from a little further back in the theatre, still, it will not disappear entirely even if one should view the picture from the last row of seats.

This distortion is present in every theatre where the projection room, or suite, is located higher than the screen, so that the throw is at a considerable angle. Naturally, people who are not aware of the cause of this distortion will endure the discomfort of viewing a show from the front seats as the penalty for arriving late at the theatre; those patrons who chance to be seated much further back will probably not realize the poor quality of projection—but! if these patrons ever once set their eyes on a correctly proportioned picture, it will be that particular theatre that will get their patronage in the future.

There is no escaping this distortion except the proper location of the projection room. The room may be equipped with the finest lenses money can buy, but if the projection room is located at a height above the screen—say, at the top of the balcony—that distortion will persist. And the difficulty is not caused by inferior pro-

jectors, poor quality projection work or defective lenses; it is due simply to the working of the laws of light projected and then reflected at an angle.

This distortion is known technically as a "keystone" effect and is due to the greater spreading of the rays of light which have a longer travel from lens to bottom screen than do those from lens to upper part of screen. The proper locating of the projection room will permit a lens to give its passage to light beams on a comparatively level throw to the screen. Then all rays will have the same approximate travel distance, all spread will be approximately identical, and the resultant picture, as compared with the distorted one thrown from a more or less elevated position, will be a perfect rendition of what the camera saw when the picture was photographed.

Anyone who has ever used a small Kodak and tried to take a picture of a building at some point where, in order to get the whole building in the picture, he has had to tilt the camera upward, is aware of the results obtained by this method. Yet, to a perhaps more limited extent, the improper locating of a projection room invites just the same sort of distortion.

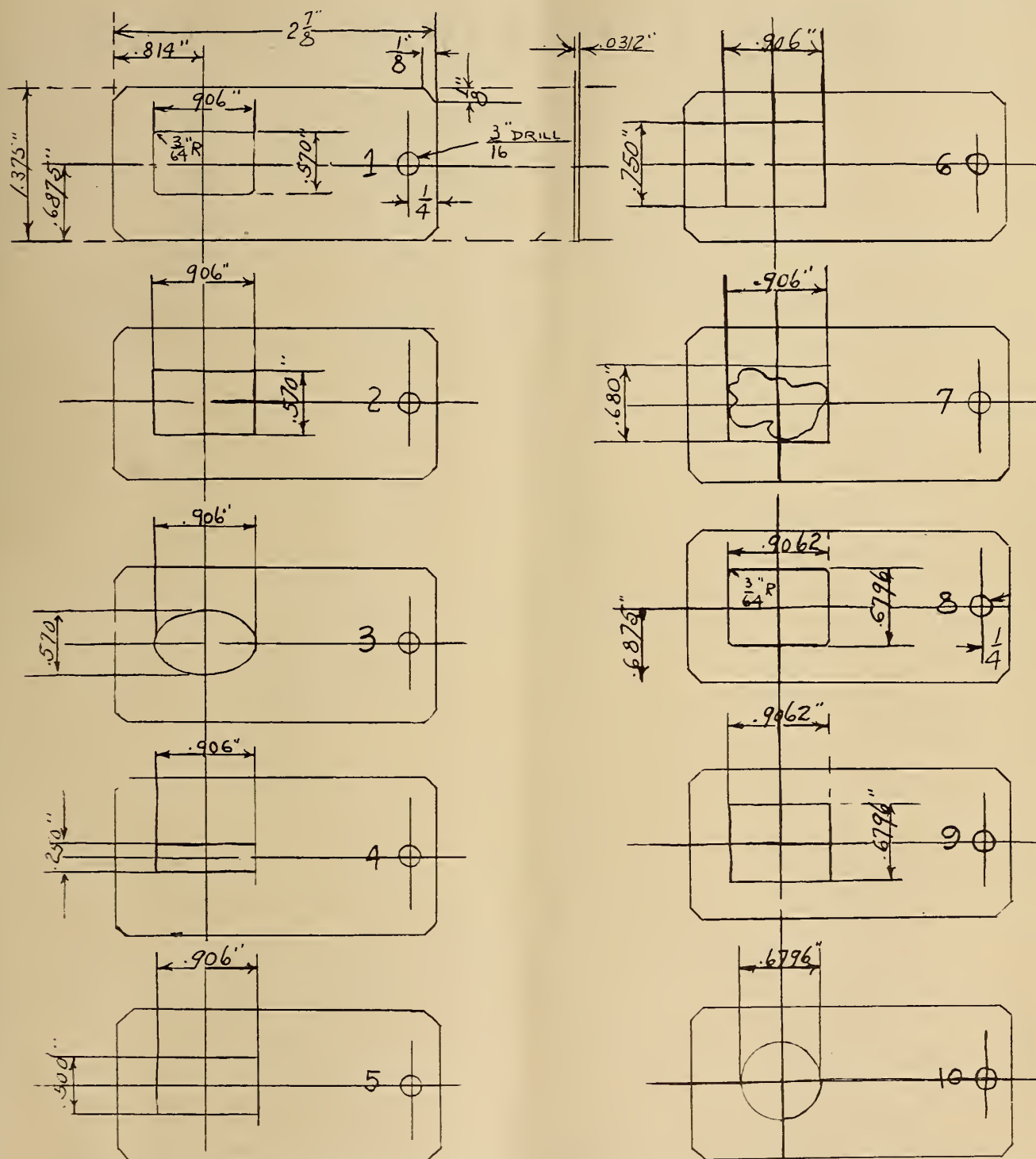
The human eye to a certain extent tries to correct distortions, to justify things which are not true with our conception of what they should be. But this effort to justify matters uses up energy, and has, if prolonged, a tendency to produce eye-strain, eye-weariness, and mental discontent with the condition producing the effect, even though that condition is not understood.

The time to guard against all these dangers is when the theatre is being planned, or as the case may be, remodelled so that later the patrons may not say "I hate to go to that theatre; the pictures tire me out so," or "It tires me to look at pictures. I don't know why, but it does."

Reactions of this sort are perfectly natural and inevitable regarding theatres where distorted pictures are shown.

In some theatres, when the side lines of the picture are seen to fail to justify, due to this keystone effect, with the vertical sides of the screen, the manipulation of the apert-

(Continued on page 32)



APERTURE MASKS

DESIGNED and USED

by

ARTHUR SMITH

Supervisor of Projection, Roxy Theatre, New York

Testing Projection Lenses

By FREDERICK KOLLMORGEN

FROM the projection room, quite a distance away from the screen, almost every lens seems to give a good picture. The distance is so great that the defects of a lens, unless very coarse, cannot be clearly distinguished.

Quite different, however, is the aspect of the picture to the audience, particularly by those in the front rows of a theatre. Here, every bit of blurring, every color fringe or distortion caused by faulty lens design or careless manufacturing methods, will show up, and often is the cause of actual eye distress to the patron.

It is essential, therefore, for every projectionist to make certain that he has a perfect lens, the very best he can obtain, and he should make very careful tests and comparisons before he purchases his lenses.

Obviously, since the function of the lens is to project a picture from a perfectly flat object (the film) upon a perfectly flat surface (the screen), the best test film would be that which contained sharply defined characters all over. Unfortunately, a film cannot be held stationary long enough to allow a critical examination, and if run through the projector the slightest movement would interfere with careful study of the fine details. A stationary test object is therefore essential.

Some manufacturers use for this purpose a flat steel plate having a number of holes drilled through it, as shown in Figure 1, but this makes a very poor test object. The holes in the plate, no matter how perfectly made, have a perceptible depth, and instead of the openings in the surface being projected onto the screen, it is quite possible that at the edge of the field an elliptical cross-section is projected, part of which lies in a different plane and is therefore out of focus (Figure 2). Also, in the intense heat of the lamp the steel plate buckles and is no longer flat, as it properly should be.

The steel plate test, therefore, gives results which are quite unreliable. A poor lens may show up better in this test than a good one, for, since a poor lens has a curved image surface, while a good one has a flat surface, when the object takes the shape of the curve, as the steel plate when it buckles, the holes at the edges may be sharp and in focus, while the edges of a moving film, which is always flat, would be out of focus. The test object should therefore always be perfectly flat and liable to be warped by heat.

The test object employed by the Kollmorgen Optical Corp. is free from all these objections, besides being far more sensitive. It consists of a thin plate of optically clear fused quartz which is placed in the film aperture. One side of this plate is chemically silvered, and through the microscopically thin silver film a network of fine lines is cut by means of a dividing engine. Figure 3 shows a view of this plate; the lines are .04" apart and .001" wide. The projection lens under test throws a picture of this reticule upon the screen, and this picture shows up mercifully very little defect either in the design or in the execution of the lens.

Faulty color correction will show red and green fringes to the clear lines, and, what is worse, make the lines themselves appear dull and murky instead of brilliant white,

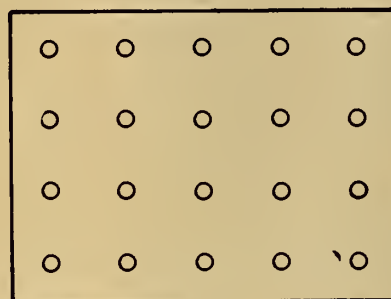


Fig. 1

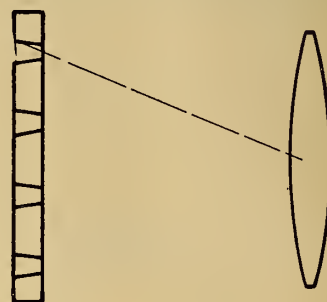


Fig. 2

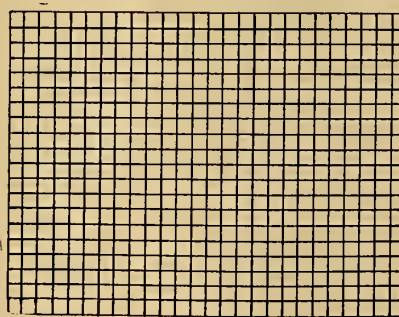


Fig. 3

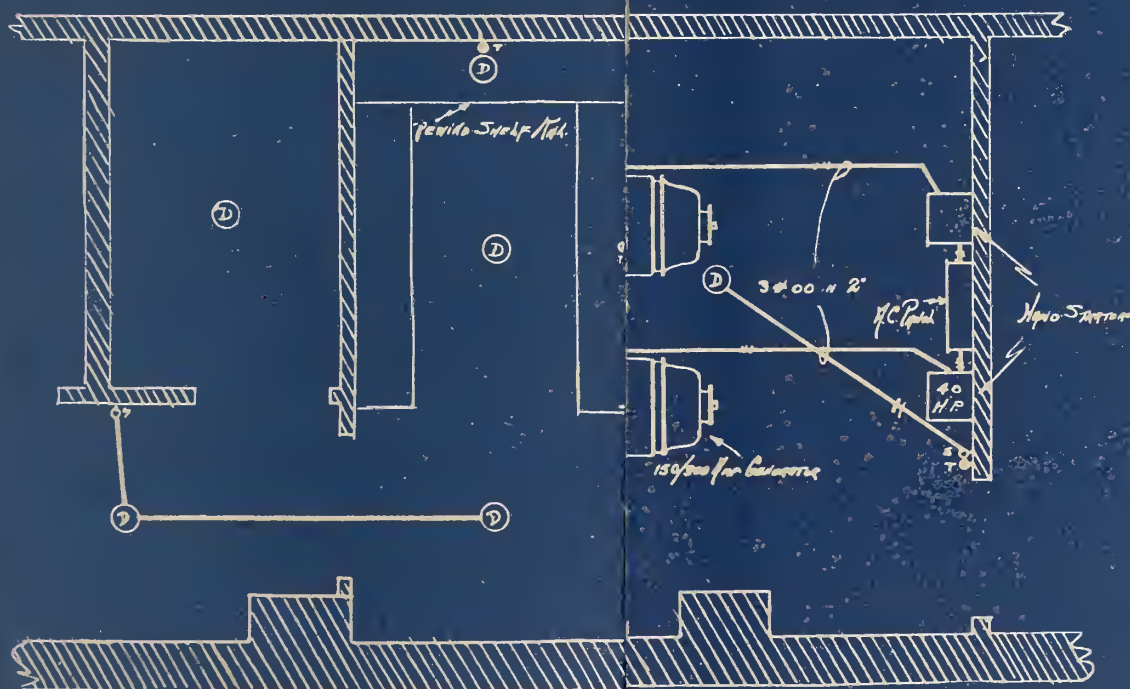
thus giving a picture lacking in contrast.

What optical engineers call "spherical aberration" will show up by the inability to obtain a crisp picture in the center of the field; curvature and astigmatism will show the edges of the field blurred and streaky when the center is sharp. In some lenses the correction is such that a good picture can be obtained at the edges and at the center, but not while the lens is at the same focus.

Only a lens which is first-class in every respect will show up clear-cut white lines at right angles to each other all across the field at the same focus.



| CODE | |
|------|-------------------------|
| T | TABLE OUTLET |
| S | SWITCH |
| B | SEALED BOX WITH |
| D | DRAWING |
| R | REAR VIEW |
| SD | SEMI-DIRECT STAGES |
| PD | PROJECTOR BOX BY OWNERS |



Published March, 1928

by

MOTION PICTURE PROJECTION

45 West 45th Street, New York City

BOONE MANCILL, PUBLISHER

| | |
|--------------------------------|----------------------|
| KORN'S, INC. | |
| Projection Dept. | |
| Projection Room No. 1712, Park | |
| Drawn by No. | Drawn by (Signature) |
| PR 12 | Date DEC. 2, 1927 |
| Approved (Signature) | |



by

BOONF MANO ALI., PUBLISHER

Louisville Kentucky.

KORN'S, INC.
PROJECTION DMP F
"Production: Rua De April, Paga"
Deno. de No. Dena. de (Older)
PR 12 Deno. Dec. 5, 1989
Deposito: 1989. 6. 1989

D. C. MOTORS

By JAMES R. CAMERON

THE general principles governing the construction of dynamos apply equally to motors. The conditions under which motors work, however, are more trying. Subjected to varying loads, and placed in positions where they are exposed to damp, dirt, fumes, gassy atmosphere and mechanical injury, they require a degree of protection which is not usually necessary in the case of a dynamo.

It is, therefore, a common practice to design them in such a way as permits of totally enclosing the windings and brush gear when necessary. Unless conditions require it, motors are not completely enclosed, as this considerably reduces their output. For instance, a motor which is rated at, say, 5 H.P. as an open type of motor would give only about 3 H.P. as an enclosed motor, reckoning on the same temperature rise.

It is a very common practice to fix ventilating covers over the commutator and brushes to protect them against mechanical injury and to minimize risk of fire. The openings in the frame at the pulley end are also sometimes provided with ventilating grids for the same reason. A motor protected in this way is known as a ventilated enclosed motor; one in which the end covers, including the commutator covers, are solid and not provided with ventilating apertures is called a totally closed motor.

A pipe ventilated motor has a fan fixed on the armature shaft and an inlet and an outlet are provided in the solid enclosure to which ventilating pipes can be connected. In the best type of motor the covers over the commutator are hinged and provided with fastenings; the terminals also are enclosed in a metal box with a hinged lid. The latter is not yet a standard practice, but it is a very convenient one for the attendant.

Winding

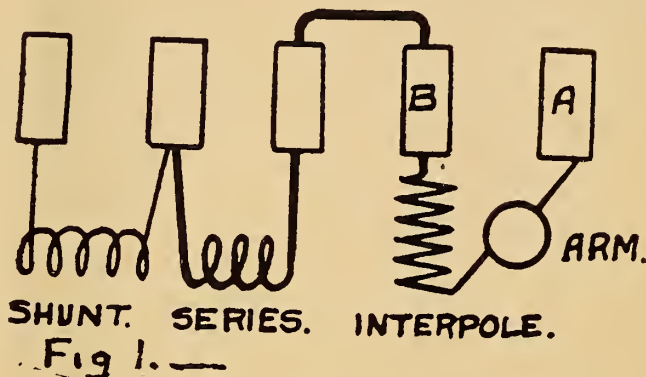
Motors, like dynamos, may be wound in one of three ways, viz., shunt, series, or compound.

Shunt-wound motors may be used for any steady load which requires an approximately constant speed, such as the driving of line shafts, or for any machinery having a steady rotary motion.

Compound-wound motors are used for driving machinery taking varying loads, or for machines which are frequently started and stopped. Small printing machines, punching and shearing machines, circular saws and the like, and any machines in which the work is thrown on and off suddenly, should be driven by compound-wound motors.

Series-wound motors are suitable where a large starting effort and constant load are required, and where it is not possible for the load to be thrown off. Feed pumps, trains, automobiles, pressure fans and the like, are best driven by series-wound motors, which should be geared or coupled direct to the work. It is risky to use a series motor for a belt drive, as, in the event of the belt breaking or coming off the pulleys, the motor might race dangerously.

Where a wide speed range by field control is required, interpoles are fitted to both shunt and compound motors. Shunt motors with interpoles are frequently used now in-



Compound Interpole Motor Terminal Box
(To reverse direction change on A and B.)

stead of compound motors, but they are not so good from the point of view of low starting current.

Reversing Direction

It is sometimes necessary to reverse the direction of rotation of a motor. This is done in the same way as reversing the polarity of a dynamo, viz., by reversing the armature or the field connections, but not both. Reversing the supply cables does not affect the motor, because this has the effect of reversing both the armature and the field.

When all connections are brought up to a terminal box, the direction of rotation can be reversed by a simple change of the connections. The changes necessary for reversing a compound interpole motor are indicated in Figure 1.

The terminals, A and B, embrace the armature and interpoles. The latter must always be treated as part of the armature, and reversed at the same time. The alternative is to reverse both shunt and series windings in a compound machine, or the shunt only in a shunt machine.

Relation of Winding to Speed Variation

To obtain constant voltage in a dynamo a compound winding is used, and it might be supposed from this that a compound-wound motor should run at a constant speed. It is possible to compound a motor to do this, but the series field winding must in this case oppose the shunt, not assist it.

This is, however, a form of winding very rarely used, and then only under exceptional conditions. There are two principal objections to this winding: first, that it weakens the field when the armature current is greatest and tends to produce sparking; second, that on an overload the series may overpower the shunt coils and reverse the polarity, causing the motor to run backwards.

For most purposes the speed variation of a shunt motor is not objectionable. In cases where constancy of speed is a great consideration, a shunt regulating resistance may be used in connection with a shunt motor, by means of which the speed may be adjusted.

(Continued on page 32)

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CHICAGO

February 29 1928

Mr. Boone Mancall
Motion Picture Projectionist
45 West 45th Street
New York City

Dear Sir:

Permit me to say that I consider your publication, The Motion Picture Projectionist the best thing that has happened to our craft in many years. We needed one for many years and we welcome your paper with great enthusiasm.

I am writing to you to inform you that you may rely on the cooperation of Local 110 to the fullest extent. I know that every member will subscribe for it. We are all plugging it.

The publication is a great educating influence and if the manufacturers and distributors of equipment are really interested in building up the good-will of the projectionist they will use this paper first of all. As far as I know no other paper reaches our men. Yours fills the bill.

Says Maloy:

*"We Welcome
Your Paper
with Great
Enthusiasm."*

With best wishes for your success

Sincerely Yours

Thos. E. Maloy
Business Manager
Local 110
Chicago, Ill.

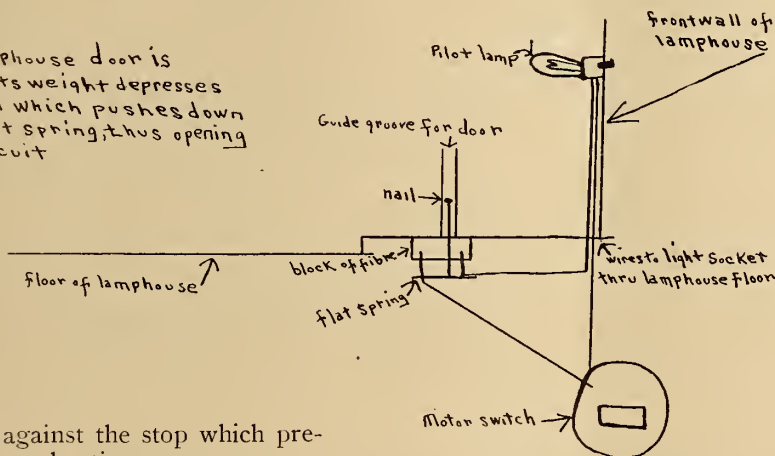
STUNT By M. McLEAN

Just recently the Empress Theatre in Edmonton, Canada, installed two Powerlite low intensity reflector lamps, and M. McLean of Local 360 made some additions to them as follows:

As the clamp levers got uncomfortably warm for bare fingers, he cut four 2-inch lengths off the old No. 4 asbestos covered lamp leads, pulled the covers off the wires and slipped them over the clamp levers, so now he can change carbons without feeling the heat.

To prevent the dowsers being left partly open, he bolted a narrow strip of metal $1\frac{1}{2}$ " long to the bottom of the cone, letting the end protrude $\frac{1}{4}$ ", so that when the dowsers are closed

When lamphouse door is closed, its weight depresses the nail which pushes down the flat spring, thus opening the circuit



it comes against the stop which prevents it overshooting.

A tin cone is used to enclose the light beam from the cooling plate to the front of the lamphouse. On one projector this is fastened rigidly, but on the projector with the stereopticon attachment the cone is bolted to one side of a common hinge, the other side of which is held to the cooling plate by the top and bottom bolts on the near side. This allows the cone to swing back (toward the screen) out of the way when running slides.

The pilot lights inside the lamphouse are well-located; the light socket is held to the front wall by a single bolt. The center of the socket is $11\frac{1}{2}$ " above the floor of the lamphouse and 4" over from the near, or door, side. When the lamp is screwed into the socket it comes just below the center bar and permits the door, when opened, to pass just over it; this position affords the lamphouse plenty of light and prevents any direct light in the eyes. The switch is arranged to put out the light when the door is closed.

F. P. BROADBENT, Secretary

"We Need Uniform Cue Sheets"

Editor,
M. P. Projectionist:—

I have read the article on uniform cue sheets by Paul Ament in your February number, and I wish to say that I agree with Mr. Ament on the need of uniformity in the matter of cue sheets. It certainly is surprising that some one of all the projectionists in this country have not yet hit upon a simple, workable cue sheet plan that could be made standard. While agreeing with the substance of Mr. Ament's article, I do not think that his method is entirely satisfactory. I know quite a few projectionists who use numbers for the cues, and the plan seems workable. Mr. Ament apparently is on the right track, and I for one would be pleased to see him improve on his basic idea and

turn out a job that would be made standard.—J. B. DAY, Local 356, St. Paul, Minn.

Mr. Day is now working on a plan for a uniform cue sheet which will, it is hoped, be received in time for the next issue. Mr. Ament's article in the February issue aroused no little comment and directed attention to a situation which challenges the ingenuity of projectionists. Further information on this subject will be welcome.—The Editor.

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Twenty Years Ago

By WESLEY TROUT

TWENTY YEARS AGO when the motion picture theatre was usually a vacant store with a few flashy banners and a "barker" outside, little attention was given to the construction of the projector, lenses, current generation and projection room construction. The projector or "machine" that the "operator" was called upon to preside over was a shaky affair representing largely the individual ideas of the manufacturer. The "operator" usually had his troubles operating this crude machine because the machine would be of one standard and the film of another. Usually the screen results were far from pleasing to the audience. However, the operator was compelled to operate the machine satisfactorily regardless whether it was designed to suit his convenience or not, and, believe me, it was *NOT* always a bed of roses for the fellow in the "coop."

After a short time this condition of chaos was realized with the result that today the film, cameras and projectors have been built to conform to a uniform standard. The sprockets, frame line, size of aperture, film perforations and so on are all now standardized.

But from year to year the manufacturers and projectionists realized that many changes in the lamphouse, mechanism, base and takeup were necessary in order to meet the increasingly exacting demands of better projection. Happily this condition was gradually rectified with the assistance of projectionists, engineers and manufacturers. Today the modern projector stands as a monument to the wonderful strides made by manufacturers with the co-operation of projectionists.

Considerable thought has been given to the base of the modern projector. The design of the base of any projector is important for rock-steady projection on the screen. Matters are simplified now that the manufacturers have designed bases that are rigid, provided with leveling screws, etc., and are of rugged design to stop all vibration of the projector itself.

Of recent years, manufacturers have given considerable thought to the "heart of the projector"—the intermittent movement. This has now been developed from a crude movement to one of hair-line accuracy and one from questionable life and performance to one of durability and dependability.

In the old days one of the projectionist's greatest problems was the annoyance of belt slippage, belt breaking, poor grade of belts, etc., and the consequent non-uniform speed of the projector. This trouble has been greatly eliminated with the development of projectors being built with a beltless motor drive and other very dependable methods of projector drive. Projectionists using projectors with belt drives should always keep an extra set of belts on hand to avoid delays.

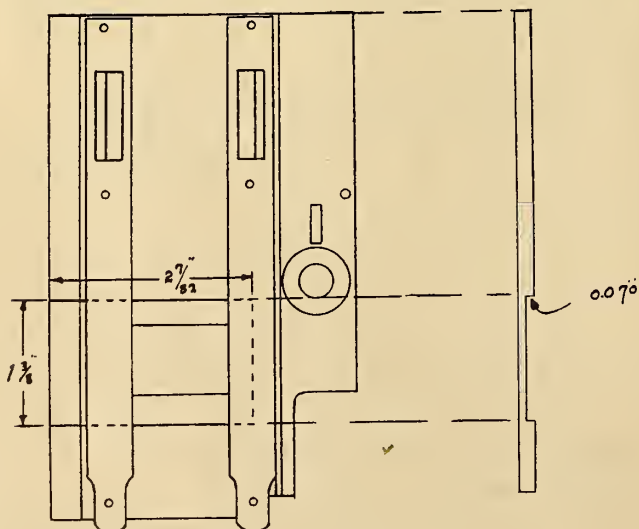
The application of correct tension to the film has now passed on from the experimental stage to known definite standards. The correct amount of tension on the film and the correct method of applying it have both been worked out to just the right degree to secure rock steady projection on the screen at most any reasonable projection speed.

The framing device of the modern projector has received very careful attention by manufacturers. The framing of the picture has been so improved upon that the action is smooth, rapid and of positive action. When a mis-frame does occur, it is evenly and smoothly corrected without disturbing the entire mechanism or moving with a quick jerk.

Vitaphone: System "B"

(Continued from page 14)

BELOW: Method of Insertion of Aperture Masks Shown on Page 17.



The Emergency equipment is operated without the 6000-A rectifier, and in the place of this equipment is a set of storage "B" batteries to supply plate voltage to the 8-B and 9-A amplifiers. The 9-A amplifier takes the place of the 10-A amplifier used in the regular system, (See Fig. 10) and its functions are the same. The emergency amplifier is started as follows: Light the filaments of the tubes on the 8-B amplifier, as previously directed, then light the filaments of the 9-A amplifier and check the filament current by means of the 514-A meter panel as directed and adjust filament current by means of the filament control rheostat mounted on the 9-A amplifier. Then (having already closed the "B" battery switch in the storage battery room) turn on the snap switch marked "PLATE" to the "ON" position located on the 545-A power control panel (emergency) and adjust plate voltages as previously directed. You are now ready to use the emergency amplifier.

Please note here that these instructions are *NOT* to supersede the instructions given by the manufacturer. These instructions are given to help the operators to a better understanding of the various types of apparatus on the market—"an operator that knows his job, likes his work and is therefore a better operator."

ANSWERS

To Problem By MAX HOLLANDER

Max Hollander's problem in the January issue evidently proved a stickler, for up to and including February 1, the date originally set as the last on which answers would be accepted, no one submitted the correct answer.

In order to give our readers in the Western States an opportunity to forward their answers the closing date was extended to February 28.

Mr. Hollander supplies the following answer to his problem: "The cut-off blade on the shutter of one machine was wider than that on the other, hence one machine projected a brighter picture than the other." Out of a total of 73 replies received, the only one to solve the problem was Johnny Pross, a member of Local 306, New York City, whose answer follows:

"I feel confident that the trouble was caused by the shutters on the projector. In other words, the shutter on one projector had wider blades than that on the second projector. If both shutters were of the same size, the trouble would be eliminated, and both projectors would give the same amount of illumination.

Jack Bader, also of Local 306, was runner-up to Pross. Bader concluded that one projector had a 3-wing shutter, and the other which gave the stronger light, a 2-wing shutter.

A majority of the answers were particularly interesting and were indicative of the many splendid craftsmen in projectionist ranks. Those who merit special mention by the intelligent answers they submitted are, in addition to Pross and Bader:—Kenneth Sewell, Anacortes, Washington; Claude McAdams, Amarillo, Texas; J. W. Carpenter, Austin, Texas; James Baskerville, Rockville Centre, L. I., N. Y.; and Harold Schlig, New York, N. Y.

New German Lens Discovery

Perfection of a variety of sixteen prizma lens, introduced with splendid results by German producers, has been the notable advancement achieved in the European motion picture industry in the past year.

The invention is a revolutionary innovation in photodrama cinematography. There are but few of these lenses available in Germany now, inasmuch as the inventors had not anticipated the great demand for them from America.

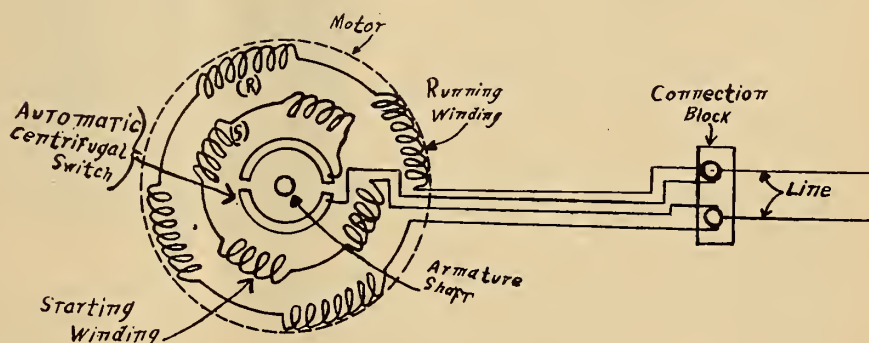
MOTOR STUNT

By John Sauerborn

A single-phase, split-phase induction motor has a main winding (R) and an auxiliary winding (S). The main winding is sometimes called the "running" winding, and the auxiliary winding the "starting" winding.

The main winding is arranged on the inner periphery of the motor

volve. After the rotor begins to speed up, the starting winding is no longer needed. Therefore, a centrifugal switch (S) is connected into the starting winding and is usually mounted on the rotor, so that when the rotor picks up speed the centrifugal force opens the switch; after the motor reaches almost full speed,

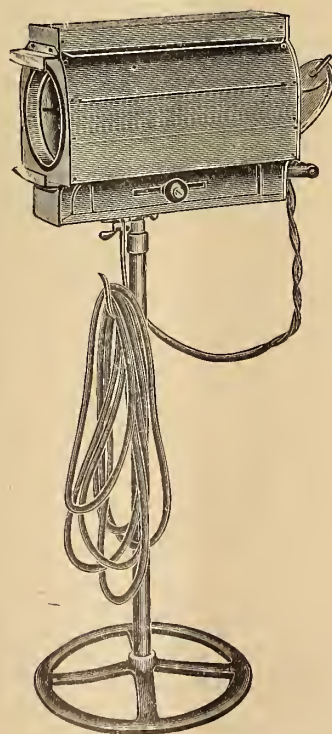


frame, which is similar to that employed on any other single-phase motor. The starting winding is displaced from the main winding by a certain number of slots.

The function of the starting winding is to produce a rotating magnetic field before the rotor begins to re-

volve. After the rotor begins to speed up, the starting winding is no longer needed.

Thereafter the running winding produces the rotating magnetic that keeps the motor in operation. The starting winding is connected in parallel with the running winding before the centrifugal switch is opened.



CHICAGO STAGE LIGHTING COMPANY

Stage Lighting Equipment
Foot Lights—Dimmers
Border Lights
Spot Lights and Flood Lights

LAMPS FOR RENT FOR ENTERTAINMENTS, BANQUETS, ETC.

Manufacturers of Portable,
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Switchboards

55 W. Wacker Drive

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CHICAGO, ILLINOIS

How Charleston Local Does Things ^{By J. H. KEENER}

RECENTLY a member of Local 333, Charleston, S. C., was supplied with a print that obviously had received careless handling by the projectionist on the previous run. Instead of grumbling to himself or to his brothers, and accomplishing nothing, the projectionist brought the matter to the attention of his Local, and the following letter was sent the offending party, whose identity had been established by a piece of paper pasted on the ends of the reels:

Dear Sir:—

We used a picture during February, at the ends of the parts of which was piece of paper pasted on the film. This paper bore the name of a commercial establishment in your town.

We are cooperating with the exchanges in keeping prints in good condition and we want to give our employer and the public good projection; but in order to do this we must cut out the paper you have pasted on the reel.

We ask, therefore, that you do your part and not put paper, scratch or punch holes at the ends of the print. A moment's reflection on your part would, we believe, show you the fallacy of improperly treating film. There are many ways to cue a change. Our craft now has an excellent magazine, THE MOTION PICTURE PROJECTIONIST, which has covered this subject exhaustively, and a letter to its office will bring you any information you may wish not only on how to properly handle film but on any phase of projection. If you are not already a subscriber, may we suggest that you subscribe immediately, as any projectionist can materially better himself by reading this paper.

Thanking you for your cooperation in future and inviting your aid in our work for better projection,

Very truly yours,

J. H. KEENER, Sec., Local 333

A similar letter was sent to the owner of the theatre, urging him to insist that his projectionist do nothing that would damage any print. This letter also directed

In the interest of SERVICE and SAFETY please do not hold UNNECESSARY conversation with projectionists.

No one allowed in Projection Room except Authorized Parties.

By order of

**I. A. T. S. E. & M. P. M. O.
LOCAL 333**

the owner's attention to the fact that poor projection resulted in poor shows and dissatisfied audiences. Though outspoken and direct, the letter was friendly in tone and gave the impression of seeking to aid the owner in securing his cooperation for better projection and satisfied patrons.

Local 333 has long been active in bettering projection in its district and the foregoing is another indication of their progressiveness in that direction.

Commonly Used Animated Effects* ^{By J. H. KURLANDER}

Aurora Borealis, changing color effect.
Babbling brook.
Blizzard effect.
Burning forest, panorama.
Clouds passing moon; moon stationary.
Moving fleecy clouds with rising moon.
Country scene, panorama.
Cyclone effect.
Cyclone with flying objects.
Descending clouds for imaginary ascension trip.
Falling flowers.
Flying angels.
Flying birds.
Flying butterflies.
Fog effect.
Flood with floating objects.
Falling flags.
Fire and smoke effect.
Flames.
Inferno spectacular effect.
Lightning effect, three brass slides, used in slide carrier, with lightning shutter used in effect holder.

Moon picture slides, with appearing and disappearing clouds.
Moonlight water ripple, with metal mask.
Fast moving dark storm clouds.
Slow moving fleecy clouds.
Moving and evening sunset clouds.
Moving river.
Midnight sun.
Ocean waves.
Rain effect.
Rainbow prism effect with metal mask.
Sand storm effect.
Volcano effect, used on triple dissolving projector or three spotlamps. Eruption, flowing lava, rain of fire and ashes.
Waterfalls effect.
Automatic revolving color wheel.
Blending colors effect, with glass design slides.
Waving American flag effect.
Flying bluebirds.
Flying fairies.
Falling sunbeams.

*Reprinted from Transactions of S.M.P.E.

What Projectionists Are Doing

Local 186 Springfield, Mass.

More than 3,500 attended the big Movie Ball given by Local 186 at the Springfield Auditorium on the evening of February 16.

Early in the evening the Reception Committee, headed by Edwin Webber was host at a dinner at the Hotel Kimball to the invited guests who included Sigrid Holmquist, Margaret Clayton, Gladys Hulette, Clara Kimball Young, James Kirkwood, George Walsh and Crane Wilbur. The guest of honor was James R. Cameron, author of "Motion Picture Projection."

Immediately after dinner the guests were motored over to the Auditorium, where McEnelly's Victor Recording Orchestra and the Hotel Bancroft Orchestra were furnishing music for dancing.

Shortly after 10 P. M. General Chairman of the Ball Committee, John F. Gatelee introduced the entertainers: William Wayne and Marie Callahan, principals from the "Good News" show; 16 Follies Tiller Girls; Norman Bros., novelty dancers; George Brouittett, Glas-meyer Sisters and Beulah Ore. Then followed a "Beauty Revue," participated in by more than twenty show girls from New York productions who appeared in old historical costumes, presenting a striking picture.

It was long after midnight before the grand march got under way, but from then on until the strains of "Home Sweet Home" were heard there was not a dull moment.

Great credit for the success of the Ball is due the various committees, headed by General Chairman Gatelee, who is, by the way, President of the Massachusetts C. L. U. The committees follow: General Chairman, John F. Gatelee; Advisory Committee: J. Louis Lambert, Michael Shea, Edwin B. Webber; Entertainment Committee, Dave Roberts, Frank Fennessy, Edwin B. Webber; Program Committee, Frank Walsh, Evan Elia, Ray Mack; Dance Committee Mike Shea, Fred Morrill, William Cook; Ushers, Steve Colter, Sam Small, Abe Beeker, Al Webb, Arthur Payette, Oril Ducharme; Treasurer, Frank Fennessy. Chief Electrician, Granville Guy Best.



Frank R. Day

Local 306—New York City

On Tuesday, March 13th, over eight cases of food and clothing were dispatched to the Miners' Relief Fund; this in addition to a cash contribution of more than \$225, which was also forwarded to the Committee.

Local 306 feels justly proud of its contribution to the Fund and regrets that it couldn't send twice the amount it did. It is only fair to state that the appeal for aid for the miners was made at a meeting only several weeks ago.

* * *

During the month the officers of The Manhattan Projection Society arranged a midnight meeting at the Movietone Studio to which the entire Local membership was invited. The engineers and full operating crew of the Movietone Co. were on hand, and gave willingly of their time to describe in detail the construction and operation of the device.

The meeting attracted a capacity audience which filled the Movietone studio to overflowing. Simon Terr, President of The Manhattan Projection Society, is deserving of the thanks of the membership for his efforts in arranging and overseeing the meeting.

The entire session was devoted strictly to the business in hand, that of instruction for those present, and there were no long-winded rambling discourses permitted.

FRANK R. DAY, Sec.

Local 548 Greenville, Tex.

We are glad to announce that all theatres in Greenville now 100 per cent. Union.

Brother W. P. Raoul, International representative, visited Greenville recently, after which he went on to Paris, Texas.

We had the pleasure of working once more the "Golden Gate Girls" who played here two years ago. They went over great.

Notices have been posted that the vaudeville season at the Opera House Theatre will end on March 17. The following have worked vaudeville in this house for the past six months. Stage Manager Jones, Curtain, Peters, Powell, De Busk and Carden.

The Big Four, consisting of the Brotherhood of Railroad Trainmen, Order of Railway Conductors, Locomotive Engineers and Firemen, will hold their Legislative Convention in our city next month and we have arranged a program for them that we feel will please them greatly.

The East Texas Chamber of Commerce will hold their annual convention in Greenville on May 6-7-8, and they have advised us that they expect to book at least two big road shows and invited us to cooperate with them.

C. K. PETERS, JR.

Local 650 Westchester, N. Y.

The following is much too late for the February issue, but, although it will be somewhat belated in March, here goes. This is the first news we have sent your publication, but we hope to be able to contribute regularly in the future. At the first regular meeting of 1928 held in Mt. Vernon, the following were reelected to office for the year 1928-29: President, James Shaughnessy; Vice-President, Irving Weiss; Financial Secretary and Treasurer, Richard Edwards; Recording Secretary, Ira Pye; Business Representative, Arthur Martens; Board of Trustees, Chairman Anthony Guido, Fred Thome, and George Allay.

Under these officers Local 650 has progressed steadily.

F. W. McCLAIN,
(Correspondent)

How I Manage My "Effects" By PAUL AMENT

In effect work I have used for many years a system which was drummed into me by a stage electrician at the old Amphion Theatre on Bedford Avenue, Brooklyn. This electrician was a man of strong convictions on certain subjects, and I pay him the compliment of saying that, whatever his methods, one could not work with him and not learn all there was to know in the line; otherwise—out!

As I remember him, he had very large feet, and the secret of his success as a teacher lay in his ability to use these gifts. A boot a lesson was his formula for dispensing knowledge, and a lesson not assimilated thoroughly brought two boots.

For a member of years now I have used the chalk system in effect work, and I can say that it has never failed to give satisfactory results.

I have here in Keith's Palace Theatre as many as four effects on a nine-act bill. In handling effects the following points should be remembered: One should be able to take off and put on the effect without detaching the lens tube and the dutchman, at the same time keeping the effect in focus and having it matted to just the spot on the stage

desired. After the effect is once started, the lamp should never be shifted, as this procedure is likely to disconcert the audience.

When I put an effect on a lamp I mat out the opening or spot on the stage where the effect is to run and focus it. Then I mark with either crayon or chalk on each side of the movable part of the lamp. I then put a wooden wedge into the slide to hold the lens tube from slipping out of the effect, after which I wedge the effect to keep it from slipping out of the dutchman. This procedure enables me to handle an effect with complete assurance that it will not fall apart.

When ready to use an effect, slide it into the lamp, move the lamp either to the left or the right until the chalk marks meet; then lock it. The lamp may then be either raised or lowered until the marks meet; then lock that. One can then work with the effect without any concern as to whether it is properly set to the stage.

The foregoing method has always appealed to me as the best for effect work in a vaudeville house where there is only one lamp to work with.

How To Keep Well—And Efficient By DR. JOSEPH PAREJ

In my many years of practice I have had occasion to examine many motion picture projectionists. Invariably, each such examination occasioned my answering the following question: "Is there any one disease that can be said to be peculiar to motion picture projectionists?"

Apparently there has been planted in the minds of many workers in the projectionist craft the idea that they, as a craft, are peculiarly susceptible to one certain disease which they cannot avoid, try as they may. And this idea has undoubtedly been nurtured in various ways—through the advice of quacks, through misleading advertisements of useless pharmaceutical products, or through discussion of the subject with one or more of their well-meaning but misinformed fellow workers—until it has grown to be a conviction.

Now, there is no one disease that can be said to be peculiar to the motion picture projectionist; but diseases from which the projectionist suffers can in nearly all cases be classified under the title "Metabolic Stagnation," which means lessened activity of some or all functional processes of the body. This condition is brought about by the sedentary character of the projectionist's work:—lack of fresh air, lack of sunlight, noxious fumes and gases, dampness of the projection room, especially of the floor, and the projectionist's failure to take physical exercise.

The remedies for the majority of illnesses contracted

by the motion picture projectionist are obvious: ample ventilation of the projection room to eliminate fumes and gases; the insistence upon the placing of an exhaust fan in the projection room; a plenitude of fresh air (not air from the auditorium but from outdoors); sunlight whenever he can get it by being in the sun during his hours out of the projection room.

During the summer months he should take sun-baths of long duration. He should take exercises regularly, preferably out of doors. Walking is one of the best exercises for him; he should walk from three to five miles a day.

The projection room should be kept scrupulously clean, free not only from dirt but from dust, as well. A mat of some sort should be placed upon the floor, so as to keep the feet from direct contact with the cold, damp and hard concrete floor.

A projectionist should be particularly careful not to overeat, especially of meat and those food products which have a high flour content. Two meals a day of fruits, vegetables and raw salads with very little meat is all the projectionist requires. Bathe often. Constipation, even of a mild form, should be avoided, and the suspicion that one is so affected should prompt immediate steps to counteract the trouble. In other words, one should keep one's body clean inside as well as outside.

Observance of the few simple rules set forth above will certainly aid in keeping one in good health.

IMPORTANT NOTICE

We have had urgent requests from Locals and individual Projectionists throughout the United States and Canada that we retain the subscription price at \$1.50 per year for the balance of 1928. Although it is difficult to publish a paper at this low rate we are glad to comply and so the announcement of our new rate of \$2.50 is hereby automatically cancelled. The paper is still \$1.50 for one year's subscription.

Local 170—Kansas City, Mo.

The following letter has been sent out by Local 170 to more than 250 manufacturers of projection equipment:

"The meetings of instruction of the Kansas City Projectionist's Educational Society are on the second Wednesday evening of each month, and on these occasions various speakers and lecturers are presented to the organization.

"The Purpose and plan of operation of this organization is to promote the intellectual and physical well-being of its members by providing and maintaining a place of common and frequent meeting for the friendly interchange of ideas as a means of increasing the efficiency and usefulness of the membership, and the securing of a close relationship between those working as projectionists.

"It is our expectation to eventually secure the services of speakers of national prominence, men who are specialists in their particular line of activity. We have designated certain members of our organization to present the following subjects: 'Projection Mechanics,' 'Fire Prevention Apparatus,' 'Proper Presentation Technique,' 'New Equipment,' 'Optics,' 'Sound Reproducing Equipment,' 'Electricity,' and 'Mathematics.'

"We therefore extend an invitation to all motion picture projector, appliance and accessory manufacturers to have their traveling representatives appear before this organization at any time they may be in this city. This will give the society's members an excellent opportunity to familiarize themselves with your product, and undoubtedly will tend to stimulate the sale of same.

R. RANSDELL, Secretary
Kansas City P. Ed. Soc.

Local 173 — Toronto, Can.

At our first February meeting the boys decided that, now that we have a magazine, it was time to up and let the rest of the country know that we are alive, that we have "it."

Speaking of "It," some of our boys have "It" with the ladies: about a month ago Charles Tucker took unto himself a wife; and now the rumor is about that Andy Patterson will do likewise in March. It ought to be some march.

We have more or less washed up Toronto—99.44 per cent pure, so to speak. The other .64 per cent has in effect a 27-hour week at the princely sum of \$16 per, and even at that it is a "crank" job. No stumbling over one another after this number, as it is a shining example of the conditions we would still have to contend with if we were not organized. The younger members might sit back and reflect on these things with much benefit to themselves.

Toronto being the capital of the Province of Ontario, naturally the brunt of organization, etc., fell upon

it in the past. But now things are very well off. The Workmen's Compensation Act has been amended so as to include all theatre employees, which entitles us to 66⅔ per cent of our salary in case of accident as well as free medical attention and other benefits. Local 170 played a prominent part in pushing this legislation.

All projectionists in Ontario work under a license system costing \$15.00 for examination and \$5 per year for renewal. Only a man who has had a year or more actual experience is eligible for a government position.

The boys with the roadshow "Wings" were in to pay us a visit while in town and I believe they had a VERY GOOD TIME while here. This may be regarded as an open standing invitation to any of the I. A. T. S. E. boys to visit us at the Labor Temple when in Toronto.

H. N. (DOC.) ELLIOTT.

Local 333 — Charleston, S. C.

Following are extracts from a circular letter recently sent out by Local 333 to such people as we thought might be interested, now or at some future time, in knowing the reasons why a Union projectionist is preferable:

Dear Sir:—

We are taking this opportunity of directing your attention to the fact that this organization represents men that are competent in the work of projecting motion pictures. As you undoubtedly know, it is illegal for anyone other than a licensed projectionist to operate a motion picture machine. Our men have passed an examination given them by the examining board appointed by the Mayor, and consisting of the Chief of the Fire Department, the City electrician and one experienced projectionist. This is done for your safety and the safety of your family when attempting a showing of motion pictures.

We would, therefore, ask that you insist on employing members of this organization for all shows of this character. The dangers of improperly overseen electric-current machines are undoubtedly known to you, and this danger is heightened considerably in the case of the motion picture projector which uses celluloid film.

Let us supply you with experienced men for all work of this nature—men who are not only experienced and competent but men who know how to properly present a good show. By so doing you will be relieved of all concern about the safety of your audience, your family and your friends.

At first it was planned to insert the above in the form of an advertisement in the daily papers, but it developed that the rate was high enough to cause us to doubt whether the results would justify such a procedure. Finally, we decided to send out form

letters to all who we thought would be interested.

It cannot be said that the letter has produced exceptional results, but it is estimated that it acquainted many with our presence and also stated the reason for our organization—an invaluable asset at certain times.

J. H. KEENER,
Sec.

Local 360—Edmonton, Can.

Local 360 since its inception has made steady progress, and our conditions are continually improving, due in most part, to mutual agreement and understanding.

In Edmonton there is a very fair-minded group of managers; in fact, four of the picture theatres are managed by men who were formerly members of Organized Labor.

Our President, W. B. Allen, has occupied the chair for the past ten years and has been our delegate to the International Conventions since the Ottawa meeting of 1919.

Our projection rooms are kept spotlessly clean, and the addition of a bit of modern equipment would make them comparable with the best. Every winter considerable time is devoted to improving our knowledge of our craft. As I remember it, a couple of conventions back there was an effort made to replace the word "Operator" in the name of the International Alliance by the word "Projectionist." I wonder if that move has gained any support since then, and if it will be considered at the coming Convention.

F. P. BROADBENT

Local 150—Los Angeles, Cal.

Local 150 is now occupying new quarters which are a credit to the organization and which would be a credit to any Local in the I.A.T. S.E. Our new quarters are located at 212 M.E. Foy Building, 1489 West Washington Boulevard, Los Angeles, Calif.

The new quarters include a business office, a reception room, adjoining which is a large room for the convenience of the members. In this latter room are many books and periodicals, the most-thumbed volume being the current issue of THE MOTION PICTURE PROJECTIONIST.

Although we have been in our new quarters for several weeks now, we are not yet entirely straightened out, but so soon as we are, you may expect to have Local 150 represented in this department regularly.

M. J. SANDS

Classified Index of Manufacturers and Dealers

Dealers

ALABAMA

Queen Feature Film Co., 1916½ Morris Ave., Birmingham, Ala.

ARIZONA

Arizona Film Supply Co., 323 Morley Ave., Nogales, Ariz.
Chester L. Dietderich, 100-A Pleasant St., Prescott, Ariz.

ARKANSAS

Butler Theatre Supply Co., Russellville, Ark.
Ensor & Co., 215 W. 3rd St., Little Rock, Ark.
Southern Film & Supply Co., 111½ Main St., Pine Bluff, Ark.

CANADA

Cameron Bros. Theatre Sup. Co., Regina, Can.
Canadian Theatre Supply Co., 22 Dundas St., West Toronto, Can.
Canadian Theatre Supply Co., Winnipeg, Can.
Coleman Elec. Co., 258 Victoria St., Toronto, Can.
Electrics, Ltd., Montreal, Quebec, Can.
Perkins Elec. Co., 21 Wilton Sq., Toronto, Ont.
Perkins Electric Co., 2027 Bleury St., Montreal, Can.
Perkins Electric Co., 402 Film Exchange Bldg., Winnipeg, Can.
Perkins Electric Co., Ltd., Wilton Square, Toronto, Can.
Aaron Stevens, 224 Eighth Ave., Calgary, Can.
Theatre Equipment Supply Co., 553 Granville St., Vancouver, Can.
United Electric Co., Ltd., 118 Granville St., Vancouver, B. C., Can.
Wells Bros. Amusement Co., Sylvan Ave., Toronto, Can.

CALIFORNIA

Bell & Slimson, 433½ E. 3rd St., Los Angeles, Cal.
Breck Photoplay Supply Co., 2028 S. Vermont Ave., Los Angeles, Cal.
Breck Photoplay Sup. Co., 98 Golden Gate Ave., San Francisco, Cal.
California M. P. Equip. Co., 836 S. Olive St., Los Angeles, Cal.
Davis Bros., 187 Golden Gate Ave., San Francisco, Cal.
Al. Du Bus, 1072 Wilton Pl., Los Angeles, Cal.
Electrical Products Co., 1128 W. 16th St., Los Angeles, Cal.
G. Gennert, 917 Maple Ave., Los Angeles, Cal.
Ed H. Kemp, 309 Turk St., San Francisco, Cal.
Los Angeles Motion Picture Co., 215 E. Washington St., Los Angeles, Cal.
Herbert S. Mace, Redlands, Cal.
Miles Bros. of California, 1149 Mission St., San Francisco, Cal.
National Theatre Supply Co., 1910 So. Vermont St., Los Angeles, Cal.
National Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.
National Theatre Supply Co., 147 Leavenworth St., San Francisco, Cal.
Walter G. Preddy, 187 Golden Gate Ave., San Francisco, Cal.
S. L. Russel, Film Exchange Bldg., Los Angeles, Cal.
J. Slipper & Co., 838 S. Olive St., Los Angeles, Cal.
Southern Electrical Supply Co., 3rd and East Sts., San Diego, Cal.
Theatre Ltg. & Equip. Co., 253 Golden Gate Ave., San Francisco, Cal.
Theatre Equipment Supply Co., 146 Leavenworth St., San Francisco, Cal.
Theatre Supply Co., 1956 Vermont St., Los Angeles, Cal.
Western Theatre Supply Co., 121 Golden Gate Ave., San Francisco, Cal.

CENTRAL AMERICA

J. Carter Searcy, Guatemala City, Guatemala.

COLORADO

National Theatre Supply Co., 2106 Broadway, Denver, Colo.

This entire Index is corrected monthly. So far as possible it embraces every product, every manufacturer and every dealer of interest to projectionists. Manufacturers and Dealers are requested to look over this index carefully and report to us at once if their names are missing, wrongly spelled or wrong address listed. Insertions and corrections will be made at once.

CONNECTICUT

Corrigan's Theatre Equip. Co., 50 W. Main St., Waterbury, Conn.
National Theatre Supply Co., 131 Meadow St., New Haven, Conn.
Repass, Harries & Co., 255 Franklin Ave., Hartford, Conn.
Conn. Independent M. S. Co., 131 Meadow St., New Haven, Conn.
Independent M. S. Co., 131 Meadow St., New Haven, Conn.

DELAWARE

Carl B. Rehder, Wilmington, Del.

FLORIDA

Amusement Supply Co., 312½ Twigg St., Tampa, Fla.
Drollinger Theatre Supply Co., 9 S. Lee St., Jacksonville, Fla.
Griffith, G. W., Box 2333, Tampa, Fla.
Tampa Photo & Art Supply Co., 314 Twiggs St., Tampa, Fla.

GEORGIA

Consolidated Film & Supply Co., 111 Walton St., Atlanta, Ga.
National Theatre Supply Co., 102½ Walton St., Atlanta, Ga.
Southern Theatre Equipment Co., 9 Nassau St., Atlanta, Ga.
Eugene Wilde, P. O. Box 102, Atlanta, Ga.

ILLINOIS

Acme M. P. Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Amusement Supply Co., 740 S. Wabash Ave., Chicago, Ill.
Burke & Jones, Chicago, Ill.
Capital Merchandising Co., 536 E. Dearborn St., Chicago, Ill.
Chicago Stg. & Ltg. Co., 112 N. LaSalle St., Chicago, Ill.
Chicago Cinema Equip. Co., 820 So. Tripp Ave., Chicago, Ill.
C. G. Demel, 845 S. State St., Chicago, Ill.
Exhibitors' Supply Co., 825 So. Wabash Ave., Chicago, Ill.
Fulco Schaffer Sales Co., 24 E. 8th St., Chicago, Ill.
E. E. Fulton Ct., 1018 So. Wabash Ave., Chicago, Ill.
Holke Theatre Supply Co., 845 So. State St., Chicago, Ill.
Joseph Hopp, 57 E. Jackson Blvd., Rm. 604, Chicago, Ill.
Illinois Theatre Equip. Co., 12-14 E. 9th St., Chicago, Ill.
Kiefer Elec. Supply Co., Peoria, Ill.
Midwest Ticket & Supply Co., 845 So. Wabash Ave., Chicago, Ill.
Monarch Theatre Supply Co., 724 So. Wabash Ave., Chicago, Ill.
Movie Supply Co., 844 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 825 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 624 So. Michigan Ave., Chicago, Ill.
Royal Theatre & Supply Co., 180 East Ave., Kankakee, Ill.
Joseph Spratler, 12-14 E. 9th St., Chicago, Ill.
Western Motion Pictures Co., 102 W. Main St., Danville, Ill.
Co-operative Amusement & Supply Co., Gaiey Theatre Bldg., Springfield, Ill.

Dealers

INDIANA

Exhibitors Supply Co., 128 W. Ohio St., Indianapolis, Ind.
Fort Wayne Engineering & Supply Co., 6th and No. Harrison Sts., Fort Wayne, Ind.
Fulco Sales Co., 111 So. Capitol Ave., Indianapolis, Ind.
E. E. Fulton Co., 111 So. Capitol Ave., Indianapolis, Ind.
H. Liever Co., 24 W. Washington St., Indianapolis, Ind.
Muncie Film Supply Co., 202½ E. Main St., Muncie, Ind.
National Theatre Supply Co., 128 W. Ohio St., Indianapolis, Ind.

IOWA

Blackmore, W. F., 315 Brady St., Davenport, Iowa.
Dubuque Sales Co., 2734 Jackson St., Dubuque, Iowa.
Eastman Kodak Stores, Inc., 608 Pierce St., Sioux City, Iowa.
Exhibitors' Supply Co., Des Moines, Iowa.
National Theatre Supply Co., 1004 Grand Ave., Des Moines, Iowa.
National Theatre Supply Co., 10th and High Sts., Des Moines, Iowa.
Zimmerman Brothers, Sioux City, Iowa.

KANSAS

Southwest Theatre Equipment Co., Wichita, Kans.

KENTUCKY

American M. P. Co., Alamo Theatre Bldg., Louisville, Ky.
Blake Amusement Co., 435 So. 3rd St., Louisville, Ky.
Scheckler, Arthur V., Tyler Bldg., Louisville, Ky.
Louisville Film & Supply Co., Rex Theatre Bldg., 555 So. 1st St., Louisville, Ky.

LOUISIANA

Consolidated Film & Supply Co., 914 Craver St., New Orleans, La.
Crescent City Film Exchange, 621 Poydras St., New Orleans, La.
Electrical Supply Co., 324 Camp St., New Orleans, La.
Harcot M. P. Industries, 610 Baronne St., New Orleans, La.
National Theatre Supply Co., 610 Saratoga St., New Orleans, La.
Southern Theatre Equipment Co., New Orleans, La.
Southern Theatre Service, 1219 Alvar St., New Orleans, La.
Vivirito, George, 318 Batonna St., New Orleans, La.

MAINE

Pine Tree State Amusement Co., 85 Market St., Portland, Maine.

MARYLAND

Dusman, J. F., 213 No. Calvert St., Baltimore, Md.
Haelele, N. C., 228 Gay St., Baltimore, Md.
Lewy Studios, 853 No. Eutaw St., Baltimore, Md.
National Theatre Supply Co., 228 Gay St., Baltimore, Md.
Townsend, H. S., 1625 E. 29th St., Baltimore, Md.
Wyatt, E. J., 1605 No. Milton Ave., Baltimore, Md.

MASSACHUSETTS

Eastern Theatre Equip. Corp., 65 Broadway, Boston, Mass.
Exhibitors' Supply Co., 67 Church St., Boston, Mass.
Gately, J. F., 33 Lyman St., Springfield, Mass.
Handy, A. D., Boston, Mass.
Independent Theatre Supply Co., 49 Church St., Boston, Mass.
Marson, R. D., 106 Broadway, Boston, Mass.
National Theatre Supply Co., 69 Church St., Boston, Mass.

When writing to Manufacturer or Dealer for information please mention the MOTION PICTURE PROJECTIONIST

Dealers

Rotman, Morris, 26 Browning Ave., Dorchester, Mass.
 United Theatre Equip. Co., 26 Piedmont St., Boston, Mass.
 Wells & Douglas, 1108 Boylston St., Boston, Mass.
 Wetmore, B. C., 2 Park Sq., Boston, Mass.
 Wheaton, L. B., Worcester, Mass.
 Worcester Film Corp., 340 Mason St., Worcester, Mass.

MICHIGAN

Amusement Supply Co., Film Bldg., Detroit, Mich.
 Cinema Ser. Co., 141 Elizabeth St., E., Detroit, Mich.
 Exhibitors' Supply Co., 14 Elizabeth St., Detroit, Mich.
 Feldstein, A. N., 1670 Pasadena Ave., Detroit, Mich.
 Theo. Kundtz & Co., 402 Lincoln Bldg., Detroit, Mich.
 McArthur Equip. Co., 1963 Grand River Ave., Detroit, Mich.
 National Theatre Supply Co., 2105 John R St., Detroit, Mich.
 Service Theatre Supply Co., 137 Elizabeth St., Detroit, Mich.

MINNESOTA

Cunningham, H. B., 964 University Ave., St. Paul, Minn.
 General Distributing Co., 110 Lake Ave., So., Duluth, Minn.
 Huntleys, The, Winona, Minn.
 Lochran Film & Slide Service, 706 Film Exchange Bldg., Minneapolis, Minn.
 National Equipment Co., 409 W. Michigan Ave., Duluth, Minn.
 National Theatre Supply Co., 221 Loeb Arcade, Minneapolis, Minn.
 Rialto Theatre Supply Co., 56 Glenwood Ave., Minneapolis, Minn.
 Twin City Caldium & Supply Co., 706 First Ave., N., Minneapolis, Minn.
 The Western Equip. Exchange, 35 Western Ave., Minneapolis, Minn.

MISSISSIPPI

Southern Theatre Service, P. O. Box 455, Grenada, Miss.

MISSOURI

Cole Theatre Supply Co., 109 W. 18th St., Kansas City, Mo.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Exhibitors' Supply Co., 3316 Lindell St., St. Louis, Mo.
 Fulco-Schaffer Co., 3301 Olive St., St. Louis, Mo.
 Fulton, E. E., & Co., 3403 Olive St., St. Louis, Mo.
 National Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 National Theatre Supply Co., 3315 Olive St., St. Louis, Mo.
 Opera Supply Co., 601 Shubert Bldg., St. Louis, Mo.
 Sanderson Elec. Co., St. Louis, Mo.
 Sewitz & Engel Theatre Supplies, St. Louis, Mo.
 Star Film & Supply Co., 413 Edward St., St. Joseph, Mo.
 Stebbins, Charles M., Picture Supply Co., 1822 Wyandotte St., Kansas City, Mo.
 Yale Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 A-A Electric Machinery Co., 1117 Cherry St., Kansas City, Mo.

MONTANA

Western Theatre Equipment Corp., Billings, Mont.

NEBRASKA

Eastman Kodak Stores, Inc., Lincoln, Neb.
 Exhibitors' Supply Co., 1518 Davenport St., Omaha, Neb.
 Lincoln Photo Supply Co., Omaha, Neb.
 National Theatre Supply Co., 1514 Davenport St., Omaha, Neb.
 Service Theatre Supply Co., 303 No. 16th St., Omaha, Neb.
 U. S. Theatre Supply Co., 1506 Davenport St., Omaha, Neb.
 United Theatre Equip. Corp., 323 So. 15th St., Omaha, Neb.

Dealers

Western Supply Co., 2581 Kansas Ave., Omaha, Neb.
 Western Theatre Supply Co., 15th and Davenport Sts., Omaha, Neb.

NEW JERSEY

Kaufman, Frank N., 750 Broad St., Newark, N. J.
 Metropolitan Motion Picture Co., 116 Market St., Newark, N. J.

NEW MEXICO

Eastern New Mexico Theatre Supply Co., Box 548, Clovis, N. M.

NEW YORK

J. F. Adams, 459 Washington St., Buffalo, N. Y.
 Acme Exchange, 341 W. 44th St., N. Y. City.
 Amusement Supply Co., 729 Seventh Ave., N. Y. City.
 Auburn Film Co., Auburn, N. Y.
 Auburn Theatrical Supply Co., Auburn, N. Y.
 A. Z. Motion Picture Supply Co., 266 Houston St., N. Y. City.
 A. Z. Motion Picture Supply, 1413 Bedford Ave., Brooklyn, N. Y.
 Becker Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Behrend Motion Picture Supply Co., 729 Seventh Ave., N. Y. City.
 Bender, George, 28 Centre St., N. Y. City.
 Better Service Film Co., 110 Ferris Ave., Syracuse, N. Y.
 Capitol Motion Picture Supply Co., 727 Seventh Ave., N. Y. City.
 Capitol Stg. & Ltg. Co., 626 Tenth Ave., N. Y. City.
 Columbia Stg. Ltg. Co., 709 Columbia Theatre Bldg., N. Y. City.
 Crouse, Hinds Co., Wolf and 7th Sts., Syracuse, N. Y.
 Crown Motion Pic. Supplies, 729 Seventh Ave., N. Y. City.
 Empire Theatre Supply Co., 42 Orange St., Albany, N. Y.
 Empire Theatre Sup. Co., 619 Spring St., Utica, N. Y.
 Fenyessey, Carol, Rochester, N. Y.
 Gennert, G., 24 E. 13th St., N. Y. City.
 Greenbaum, 436 Cornelius St., Brooklyn, N. Y.
 Herbert & Huesgen, 18 E. 42nd St., N. Y. City.
 Hudson Elec. Equip. Co., 141 W. 44th St., N. Y. City.
 Independent Movie Sup. Co., 42 Orange St., Albany, N. Y.
 Lyon, J. T. & D. B., Schenectady, N. Y.
 Kaplan, Sam, 729 Seventh Ave., N. Y. City.
 Mason, Chas. E., 103 W. Main St., Rochester, N. Y.
 Mestrum, H., 817 Sixth Ave., N. Y. City.
 Modern Elec. Mch. Co., 2927 Third Ave., N. Y. City.
 Motion Picture Apparatus Co., 110 W. 32nd St., N. Y. City.
 Motion Picture Service Co., 417 W. 44th St., N. Y. City.
 National Theatre Supply Co., 1560 Broadway, N. Y. City.
 National Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Charles I. Newton, 244 West 14th St., New York City.
 Perfection Supply Co., 98 Park Pl., N. Y. City.
 S & M Sales Co., 123 Lafayette St., Utica, N. Y.
 Supreme Motion Picture Repair Co., 926 Broadway, Brooklyn, N. Y.
 Syracuse Supply Co., 314 W. Fayette St., Syracuse, N. Y.
 United Proj. & Film Corp., 51 Chapel St., Albany, N. Y.
 United Proj. & Film Corp., 228 Franklin St., Buffalo, N. Y.
 Univ. Elec. Stage Ltg. Co., 321 W. 50th St., N. Y. City.

NORTH DAKOTA

McCarthy Supply Co., 619 N. P. Ave., Fargo, N. D.

NORTH CAROLINA

A. & B. Moving Picture Supply Co., Raleigh, N. C.
 Carolina Theatre Supply Co., United Film Bldg., Charlotte, N. C.
 Ettabran Film Co., Charlotte, N. C.
 Exhibitors' Supply Co., Charlotte, N. C.
 National Theatre Supply Co., 222 W. 4th St., Charlotte, N. C.

Dealers

OHIO

American Theatre Equipment Co., 165½ No. High St., Columbus, Ohio.
 American Theatre Supply Co., 310 St. Clair St., Toledo, Ohio.
 Artfilm Co., Cleveland, Ohio.
 Bodiker, D. A., 128 No. Garfield St., Dayton, Ohio.
 Central F. F. Co., 60 Public Sq., Lima, Ohio.
 Cincinnati Theatre Supply Co., Broadway Film Bldg., Cincinnati, Ohio.
 Cincinnati M. P. Co., 1434 Vine St., Cleveland, Ohio.
 Dayton Theatre Sup. Co., 225 Jefferson St., Dayton, Ohio.
 Doner, Frank M., 2409 Maple Wood Ave., Toledo, Ohio.
 Dwyer Bros. & Co., 520 Broadway, Cincinnati, Ohio.
 Exhibitors' Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Folwer & Salter, Cleveland, Ohio.
 Gross & Johnson, 2100 Payne Ave., Cleveland, Ohio.
 Limbocker, George, Springfield, Ohio.
 Motion Picture Equip. Co., 17 Ervin Block, West Canton, Ohio.
 Moving Picture Equip. Co., 208 Market Ave., So., Canton, Ohio.
 Moving Picture Supply Co., 439 Falls Ave., Youngstown, Ohio.
 National Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 National Theatre Supply Co., 520 Broadway, Cincinnati, Ohio.
 O'Connor & Co., A., 9702 Euclid Ave., Cleveland, Ohio.
 Oliver Moving Pic. Sup. Co., Film Exchange Bldg., Cleveland, Ohio.
 Post Glover Elec. Co., Cincinnati, Ohio.
 Price, L. M., Co., 108 W. 4th St., Cincinnati, Ohio.
 Romell Motion Pictures, Inc., 1411 Walnut St., Cincinnati, Ohio.
 Runey, Clarence E., 1434 Vine St., Cincinnati, Ohio.
 Standard Film & Service Co., Cleveland, Ohio.
 Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Tri-State Supply Co., 2112 Payne Ave., Cleveland, Ohio.

OKLAHOMA

Anderson Theatre Supply Co., 116 So. Hudson St., Oklahoma City, Okla.
 National Theatre Supply Co., 308 W. California St., Oklahoma City, Okla.
 United Theatre Equip. Corp., 116 So. Hudson St., Oklahoma City, Okla.
 Yale Theatre Supply Corp., 10 So. Hudson St., Oklahoma City, Okla.
 Southern Theatre Equip. Co., 328 California Ave., Oklahoma City, Okla.
 Shelton, J. M., Oklahoma City, Okla.

OREGON

Bentley, E. E., Hillsboro, Ore.
 Conant, C. F., Portland, Ore.
 National Theatre Supply Co., 60 Glisan St., Portland, Ore.
 National Theatre Supply Co., 393 Oak St., Portland, Ore.
 Portland Moving Picture Mch. Co., Rivoli Theatre Bldg., Portland, Ore.
 Service Film & Supply Co., 393 Oak St., Portland, Ore.

PENNSYLVANIA

Alexander, George H., Diamond St., Pittsburgh, Pa.
 Atlas Supply Co., 108 Ring St., Philadelphia, Pa.
 Bates, George, 662 Shade St., Pittsburgh, Pa.
 Bennell, Chas. H., 261 No. Clarion St., Philadelphia, Pa.
 Bennett, C. H., 224 No. 13th St., Philadelphia, Pa.
 Catsiff, J., 1214 Market St., Philadelphia, Pa.
 Chamberlain Amuse. Enter., Inc., Shamokin, Pa.
 Columbia Film Service, 1010 Forbes St., Pittsburgh, Pa.
 Consolidated Film Co., 1237 Vine St., Philadelphia, Pa.
 Electric Theatre Supply Co., 1309 Vine St., Philadelphia, Pa.
 Gompertz, Abram B., Exhibitors' Clearing House & Supply Co., 1243 Vine St., Philadelphia, Pa.
 Hannson, J. G., 10th and Spring Sts., Reading, Pa.

Dealers

Hollis, Smith & Morton, 1024 Forbes St., Pittsburgh, Pa.
 Janicks, Michael, 1105 Gibbon St., Pittsburgh, Pa.
 Morton, Ed. B., 1006 Forbes St., Pittsburgh, Pa.
 Motion Picture Machine Co., 609 Neville St., Pittsburgh, Pa.
 National Theatre Supply, 1024 Forbes St., Pittsburgh, Pa.
 National Theatre Supply Co., 1311 Vine St., Philadelphia, Pa.
 Phila. Theatre Equip. Co., 252 No. 13th St., Philadelphia, Pa.
 Pittsburgh M. P. Supply Co., 1006 Forbes St., Pittsburgh, Pa.
 Rizzo, Clem, 262 No. 13th St., Philadelphia, Pa.
 S & S Film & Supply Co., A. Steinberg, 1026 Forbes St., Pittsburgh, Pa.
 Smith, Harv J., 436 Diamond St., Pittsburgh, Pa.
 Superior Motion Picture Supply Co., 1026 Forbes St., Pittsburgh, Pa.
 Swaab & Son, Lewis M., 1327 Vine St., Philadelphia, Pa.
 Williams, Browne & Earle, 918 Chestnut St., Philadelphia, Pa.
 Cadoret, William H., Theatre Supply Co., Scranton, Pa.
 Equipment Theatre Supply Co., Penn Ave., Scranton, Pa.

RHODE ISLAND

Allen Feature Film Co., Providence, R. I.
 McKenna, James, Providence State Ltg. Co., 12 Moulton St., Providence, R. I.
 Taylor, H. O. & E. S., 76 Dorrence St., Providence, R. I.

SOUTH CAROLINA

Independent Theatre Supply Co., 111 W. Coffee St., Greenville, S. C.

SOUTH DAKOTA

American Theatre Supply Co., Sioux Falls, S. D.

TENNESSEE

Consolidated Film & Supply Co., 226 Union Ave., Memphis, Tenn.
 Monarch Theatre Supply Co., 228 Union Ave., Memphis, Tenn.
 White Theatre Equipment Co., Phipps Bldg., Bristol, Tenn.

TEXAS

Atlantic Sales Co., 1816 Main St., Dallas, Tex.
 Dallas Theatre Supply Co., 1911 Commerce St., Dallas, Tex.
 National Theatre Supply Co., 306 So. Harwood St., Dallas, Tex.
 Peerless Film Svc., 322 San Antonio St., El Paso, Tex.
 Educational Equip. Co., 1913-A Commerce St., Dallas, Tex.
 Simplex Theatre Supply Co., Film Exchange Bldg., Dallas, Tex.
 Simpson, James P., Co., Inc., Dallas, Tex.
 Southern Film Svc., 811 Franklin Ave., Houston, Tex.
 Southern Theatre Equip. Co., 1815 Main St., Dallas, Tex.
 Thrash, R. D., Co., Film Row, Dallas, Tex.

UTAH

Alhambra Theatrical Co., Hudson Ave., Ogden, Utah.
 Argus Enterprises Co., Inc., 132 E. Second St., Salt Lake City, Utah.
 National Theatre Supply Co., 132 E. 2nd St., Ogden, Utah.
 Salt Lake Theatre Supply Co., 48 Exchange Pl., Salt Lake City, Utah.
 Universal Film & Supply Co., 56 Exchange Pl., Salt Lake City, Utah.
 Utah Theatre Supply Co., 125 E. 2nd South St., Salt Lake City, Utah.
 Worman Supply Co., 2429 Hudson Ave., Ogden, Utah.

VERMONT

Allen & Underhill, Chelsea, Vt.
 H. P. Boardman, Burlington, Vt.

Dealers**VIRGINIA**

Burchard, W. A., Co., 56 Commerce St., Norfolk, Va.
 Chocklett, Luther A., Co., Over Mt. Trust Bldg., Roanoke, Va.
 Southern Theatre Supply Co., 25 Old St., Petersburg, Va.

WASHINGTON, D. C.

Capitol Theatre Supply, 316 McGill Bldg., Washington, D. C.
 Carroll Electric Co., 714 12th St., N. W., Washington, D. C.
 Colman, 916 G St., N. W., Washington, D. C.
 Columbia Photo Supply Co., 1424 New York Ave., N. W., Washington, D. C.
 Fuller & D'Albert, 815 10th St., N. W., Washington, D. C.
 Higgins, F. L., 804 11th St., N. W., Washington, D. C.
 L & S Theatre Sup. Co., 908 G St., N. W., Washington, D. C.
 Theatre Supply Co., 916 G St., N. W., Washington, D. C.
 Lust, Sidney B., 916 G St., N. W., Washington, D. C.
 National Theatre Supply Co., 719 9th St., N. W., Washington, D. C.
 Scientific & Cinema Supply Co., 804 11th St., N. W., Washington, D. C.
 Southern Moving Picture Corp., 310 McGill Bldg., Washington, D. C.
 Thompson, E. B., 722 10th St., N. W., Washington, D. C.
 Washington Theatre Supply Co., 719 9th St., N. W., Washington, D. C.

WASHINGTON

Film Supply Co., 217 Virginia St., Seattle, Wash.
 Graham, John W., Spokane, Wash.
 Lowman & Handford, Seattle, Wash.
 National Theatre Supply Co., 1927 Third Ave., Seattle, Wash.
 Shearer, B. F., Inc., 210 Virginia St., Seattle, Wash.
 Spokane Theatre Supply Co., 410 W. 1st St., Spokane, Wash.
 Theatre Supply Co., 2016 Third Ave., Seattle, Wash.

WEST VIRGINIA

Charleston Elec. Sup. Co., Charleston, W. Va.
 Charleston Theatre Supply Co., Charleston, W. Va.
 Columbia Film Svc. Co., 707 Dryden St., Charleston, W. Va.
 Educational Film Co. of West Virginia, Charleston, W. Va.
 McGray & McGray Co., 329 Main St., Fairmont, W. Va.
 Standard Theatre Supply Co., 3608 Jacob St., Wheeling, W. Va.
 West Virginia Amusement & Film Co., 113½ Capitol St., Charleston, W. Va.

WISCONSIN

National Theatre Supply Co., 715 Wells St., Milwaukee, Wis.
 Smith, Rav. Co., 145 Seventh St., Milwaukee, Wisconsin.
 Wisconsin Film Corp., 134 Grand Ave., Milwaukee, Wis.

Manufacturers**Arc Lamps**

Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
 Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
 Cinema Studios Supply Corp., 1438 Beechwood Dr., Hollywood, Cal.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly, Inc., 129 Grand St., New York City.
 Hallberg, J. H., 445 Riverside Dr., New York City.
 International Projector Corp., 90 Gold St., New York City.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.

Manufacturers

Max Mayer Co., 218 W. 42nd St., New York City.
 Motion Picture Service Co., 417 W. 44th St., New York City.
 Mestrum, Henry, 817 Sixth Ave., New York City.
 Rollaway Motor Co., 122 Southard Ave., Toledo, Ohio.
 Strong Lamp Co., 3248 Monroe St., Toledo, Ohio.
 Wohl & Co., Inc., M. J., Payntar Ave. and Hancock St., Long Island City, N. Y.

Booths, Projection

A. G. Mfg. Co., Seattle, Wash.
 Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Blaw Knox Co., Bayard and Warner Sts., Baltimore, Md.
 Edward Mfg. Co., Cincinnati, Ohio.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Goldberg Bros., 1646 Lawrence St., Denver, Colo.
 Harry Steel Co., O. K., 2333 Papin St., St. Louis, Mo.
 Johns-Manville Co., 41st St. and Madison Ave., New York City.
 Keasbey & Mattison Co., Dept. N., Ambler, Pa.
 Langslow Co., H. R., 232 Jay St., Rochester, N. Y.
 Mestrim, Henry, 810 Sixth Ave., New York City.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newman Mfg. Co., 416 Elm St., Cincinnati, Ohio.
 Riverside Mfg. Co., Newark, N. J.
 Sharlow Bros., 442 W. 42nd St., New York City.
 Steel Roofing & Stamping Works, 506 S. W. 2nd St., Des Moines, Iowa.
 Thorp Fire Proof Docr Co., Minneapolis, Minn.
 Williams, Browne & Earle, Inc., 918 Chestnut St., Philadelphia, Pa.

Carbons

Arco Electric Co., 110 W. 42nd St., New York City.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Diesman, J. D., Baltimore, Md.
 M. G. Felder, 1560 Broadway, New York City.
 Hiegl, Frank J., 440 State St., Schenectady, N. Y.
 National Carbon Co., Madison Ave., N. W., and W. 117th St., Cleveland, Ohio.
 Phellis & Co., C. W.
 Hugo Reisinger, 11 Broadway, New York City.
 Warner Prod. Co., Inc., 265 Canal St., New York City.

Cases and Cans, Reel Carrying

Ajax Film Accessories Co., 30 Church St., New York City.
 American Can Co., New York City, N. Y.
 Fulton Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Gotham Can Co., 57 Eagle St., Brooklyn, N. Y.
 Indestructible Metal Products Co., 521 W. 45th St., New York City.
 Los Angeles Can Co., Los Angeles, Cal.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newmade Products Corp., 249 W. 47th St., New York City.
 Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.
 Russakov Can Co., Chicago, Ill.

Cement, Film

Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
 Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
 Eastman Kodak Co., Rochester, N. Y.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 International Projector Corp., 1130 W. Austin Ave., Chicago, Ill.
 Monarch Theatre Supply Co., 1223 So. Wabash Ave., Chicago, Ill.
 Newmade Products Corp., 248 W. 47th St., New York City.
 Rothacker Film Mfg. Co., 1339 Diversey Pkwy., Chicago, Ill.

When writing to Manufacturer or Dealer for information please mention the MOTION PICTURE PROJECTIONIST

Manufacturers

Technical Color & Chem. Works, 523 Third Ave., Brooklyn, N. Y.
Weldon Film Cement Co., 301 Loeb Arcade, Minneapolis, Minn.

Film Safes and Cabinets

American Film Safe Corp., Baltimore, Md.
Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
Columbia Metal Box Co., 226 E. 144th St., New York City.
Duplex Motion Picture Industries, 74 Sherman Ave., Long Island City, N. Y.
Film Safe Co., 92 William St., New York City.
Agent for American Film Safe Corp., Baltimore Md.
Fulton, E. E., 3208 Carroll Ave., Chicago, Ill.
Neumade Products Corp., 249 W. 47th St., New York City.
Sharlow Bros. Co., 442 W. 42nd St., New York City.

Film Splicing Machines

Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
Duplex Machine Co., 317 Seventy-Fifth Ave., Brooklyn, N. Y.
Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
Gennert, Inc., G., 24 E. 13th St., New York City.
Griswold Machine Works, Port Jefferson, N. Y.
Lochren Film & Slide Co., Wm. A., 706 Film Exchange Bldg., Minneapolis, Minn.
Neumade Products Corp., 249 W. 47th St., New York City.
Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.

Lamps

Edison Lamp Works of the General Electric Co., Harrison, N. J.
National Lamp Works, Nela Park, Cleveland, Ohio.
Westinghouse Lamp Co., 150 Broadway, New York City.

Lamps, Reflector

Besseler Co., Charles, 131 E. 23rd St., New York City.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
Goerz American Optical Co., 317 E. 34th St., New York City.
Kliegl Bros. Universal Stage Light Co., Inc., 321 W. 50th St., New York City.
McAuley Mfg. Co., J. E., 552 W. Adams St., Chicago, Ill.
Morelite Co., Inc., 600 W. 57th St., New York City.
Preddy, Walter G., 187 Golden Gate Ave., San Francisco, Cal.
Warren Products, 265 Canal St., New York City.

Lights, Spot

Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
Best Devices, 22 Film Bldg., Cleveland, Ohio.
Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
Capitol Stage Lighting Co., 626 Tenth Ave., New York City.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
De Bus, Al., 1072 N. Wilton Pl., Hollywood, Cal.
Diesman, J. F. D., Baltimore, Md.
Display Stage Lighting Co., 334 W. 44th St., New York City.
Enswistle, R. C., 304 W. 52nd St., New York City.
Erikson, Electric Co., L., 6 Portland St., Boston, Mass.
Franklin Electric Products Co., 750 Prospect Ave., S. E., Cleveland, Ohio.
General Electric Co., Schenectady, N. Y.
Hall & Connelly, 129 Grand St., New York City.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Klouček, Chas. E., 528 Flanders St., Portland, Ore.

Manufacturers

Mestrum, Henry, 817 Sixth Ave., New York City.
Motion Picture Service Co., 417 W. 44th St., New York City.
Newton, Chas. I., 244 W. 14th St., New York City.
Perkins Electric Co., 21 Wilton Sq., Toronto, Ont.
Precision Machine Co., 23½ So. 8th St., Minneapolis, Minn.
Sun Ray Lighting Co., 119 Lafayette St., New York City.
Universal Stage Lighting Co., 321 W. 50th St., New York City.
Wheeler Green Electric Co., 29-39th St., Rochester, N. Y.
Wohl & Co., M. J., Hancock St., Long Island City, N. Y.

Projectors

American Motion Picture Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Baird Motion Picture Machine Co., 31 Runyon St., Newark, N. J.
Bell & Howell Co., 1801 Larchmont St., Chicago, Ill.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
International Projector Corp., 90 Gold St., New York City.
Kaplan, Sam, 729 Seventh Ave., N. Y. City.

Reels, Film

Acme Stamping & Mfg. Co., Pittsburgh, Pa.
Duplex M. P. Industries, Inc., Long Island City, N. Y.
Geometric Stamping Co., 221 E. 131st St., Cleveland, Ohio.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, Ohio.
Goldberg Bros., 1646 Lawrence St., Denver, Colo.
Heigel, Frank J., 440 State St., Schenectady, N. Y.
Mossberg Co., Frank, Attleboro, Mass.
Neumade Products Corp., 249 W. 47th St., New York City.
Sharlow Bros. Co., 442 W. 42nd St., New York City.
Taylor-Shantz Co., 478 St. Paul St., Rochester, N. Y.
Winship & Sons, W. W., Utica, N. Y.

Reflectors, Light

American Reflector & Lighting Co., 100 So. Jefferson St., Chicago, Ill.
Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
Curtis Lighting Co., 1119 W. Jackson Blvd., Chicago, Ill.
Erickson Electric Co., 6 Portland St., Boston, Mass.
Frink, I. P., Inc., 239 Tenth Ave., New York City.
General Outdoor Advertising Co., 550 W. 27th St., New York City.
Heinrich Reflector Co., 645 W. 43rd St., New York City.
Hub Electric Co., 2219 W. Grand Ave., Chicago, Ill.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Major Equipment Co., Inc., 4603 Fullerton Ave., Chicago, Ill.

Rewinders

Atlas Metal Works, Dallas, Texas.
Automatic Film Rewinder, Harrisburg, Pa.
Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill.
Best Devices Co., 1514 Prospect Ave., Cleveland, Ohio.
Duplex Machine Co., 316-75th St., Brooklyn, N. Y.
Electrical Prods. Corp., 1122 W. 16th St., Los Angeles, Cal.
Lang Mfg. Works, Olean, N. Y.
Neumade Products Corp., 249 W. 47th St., New York City.
Stern Metal Works, 1006 Vine St., Philadelphia, Pa.

Rheostats

Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
Cutler Hammer Mfg. Co., Milwaukee, Wis.

Manufacturers

Duplex M. P. Industries, Inc., Long Island City, N. Y.
General Electric Co., Schenectady, N. Y.
Hall & Connelly Co., 129 Grand St., New York City.
Hertner Electric Co., 1900 W. 112th St., Cleveland, Ohio.
Hoffman & Soons, 522 First Ave., New York City.
Hub Electric Co., 2219 Grand Ave., Chicago, Ill.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Leonard Electric Mfg. Co., 3709 Perkins Ave., Cleveland, Ohio.
Newton, Chas. I., 244 W. 18th St., New York City.
Ward Leonard Electric Co., 37 South St., Mt. Vernon, N. Y.
Wheeler-Green Electric Co., 29 St. Paul St., Rochester, N. Y.

Screens

Acme Metallic Screen Co., New Washington, Ohio.
American Silversheet Co., 915 Washington St., St. Louis, Mo.
Da-Lite Screen Co., 922 W. Monroe St., Chicago, Ill.
Diamond Screen Products Co., 1222 Ontario St., Cleveland, Ohio.
Gardiner Co., L. J., 1021 W. Goodale Blvd., Columbus, Ohio.
Minusa Cine Screen Co., 2665 Morgan St., St. Louis, Mo.
Mirror Screen Co., Shelbyville, Ind.
National Screen Co., 2100 Payne Ave., Cleveland, Ohio.
Premier Screen Co., P. O. Box 861, Roanoke, Va.
Rembusch Screen Co., Shelbyville, Ind.
Royal M. P. Screen Co., 910 Manhattan Ave., Brooklyn, N. Y.
Spencer Lens Co., 442 Niagara St., Buffalo, N. Y.
Story Scenic Co., 21 Tufts St., Somerville Sta., Boston, Mass.
Trans-Lux Daylight Picture Screen, Inc., 247 Park Ave., New York City.
Walker Sunlight Screen Co., 359 Canal St., New York City.
Westner & Son, C. S., 211 N. 13th St., Philadelphia, Pa.
Western Shade Cloth Co., 22nd and Jefferson Sts., Chicago, Ill.

Slides

Acme Slide Studio, 1026 Market St., San Francisco, Cal.
American Slide Co., 165 No. High St., Columbus, Ohio.
Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
Excelsior Illustrating Co., 219 Sixth Ave., New York City.
Kansas City Slide Co., 1015 Central St., Kansas City, Mo.
Lochran, Wm. A., Film Exchange Bldg., Minneapolis, Minn.
Midland Cine Products Co., 706 First Ave., North Minneapolis, Minn.
Milano Slide Co., 112 W. Broadway, Salt Lake City, Utah.
Niagara Slide Co., Lockport, N. Y.
Paramount Publicity Corp., 111 Westchester Sq., Bronx, N. Y.
Peerless Slide Co., 706 First Ave., No., Minneapolis, Minn.
Radio Mat Slide Co., 167 W. 48th St., New York City.
Ransley, J. F., 337 Madison St., W. Chicago, Ill.
Standard Slide Co., 209 W. 48th St., New York City.
Unique Slide Co., 168 W. 48th St., New York City.
Victor Animatograph Co., Davenport, Iowa.

Tachometers

Weston Electric Instrument Co., 4 Western Pl., Newark, N. J.
Blanchard Instrument Co., Cambridge, Mass.
Consolidated Instrument Co., 41 E. 42nd St., New York City.

Meters, Electrical

Weston Electrical Instrument Corp., 7 Weston Pl., Newark, N. J.
Jewell Electrical Inst. Co., 2 Vesey St., New York City.

D. C. Motors *By* JAMES R. CAMERON

(Continued from page 19)

The term "compound winding" as applied to motors is now generally understood to mean a winding in which the series coils assist the shunt coils. The speed variation in this type of motor is greater than in shunt wound motors, because, as the load increases, the series coil tends to strengthen the field, and the stronger the field the slower the motor will run.

The percentage speed variation depends upon the relative strength of the series and shunt coils. For driving planing machines and the like, where a great starting effort is required at each reversal of the bed, as much as 30% of series excitation is frequently used, and the speed variation may be from 10% to 15% or more, according to the actual rated speed of the motor.

For such work as this the speed variation is not a disadvantage, as the motor will run slower on the cutting stroke than on the return stroke.

To test if the compound coils are assisting the shunt, run the motor light (absolutely), and note the direction of

rotation. Then disconnect the shunt; this can be done quite easily at the starting switch. Then put the starter on the first stop for an instant, and note which way the motor runs. If it does not start on the first stop, go a little further over, but do not keep on too long or the motor will race. If the series coil is assisting the shunt, the direction will be the same, and the reverse if in opposition.

Series-wound motors vary very considerably in speed with a varying load, and are therefore quite unsuited to a case where constancy of speed is desired, unless the load itself is also constant.

For the lifting motion of cranes the series motor is particularly suitable, as it automatically lifts a light weight at a quicker rate than it lifts a heavier weight.

Series-wound motors are generally used for trolley cars and sometimes for geared pumps. It is not safe to use them for belt driving, as in the event of the belt coming off the motor would race.

Projection "On the Level" *By* LESTER B. ISAAC

(Continued from page 16)

ure plate can so be handled as to cause the vertical screen side and the picture to jibe. But that does not alter the steady, immutable working of the laws of light, and the distortion within the space on the screen continues unabated; the obvious side lines are adjusted so that the effect is not so apparent, but the effect itself is not removed.

When so much money is spent these days for the finest appointments in the theatre, precaution should be taken to insure, even at a little higher cost, good projection. The projection room is the heart of a motion picture theatre. If the appointments and fixtures for a theatre are bought with an eye to quality, then the projection room equipment should be purchased and installed with the same thought in mind. And the projection room should be so located as not to preclude the possibility of good projection.

Theatre business these days often hangs on very small points. The people who patronize the theatres are educated to know good things when they are brought to

their attention, even those things which are not obvious. An audience accustomed for years to projection at an angle (distorted pictures), may not be able to argue out their position when they remark they "don't care for the pictures down at the Luxury Theatre," but if they ever sit in on projection approximately at screen level, they will realize very quickly that they like it much better than the other sort.

Modern projection suites represent a big advance in quality and in convenience for the projectionist. It is surprising that projection room location has not kept pace with the improvements in construction and design. When more exhibitors realize how much good projection can help their attendance, make people like pictures and cause them to tell their friends about it, level projection will be insisted upon.

It is squarely up to us projectionists to preach the doctrine of level projection, to insist upon it when we are consulted and to be constantly agitating in its favor.

PROJECTIONIST REPORT ON CONDITION OF FILM

Name of Theatre.....Report No.
Name of film.....Co.
Opening date.....Closing date.....
No. or Letter of Print.....No. of reels.....
First run.....Did you wax?.....
Scratch marks.....
Oil or rain effects.....
Rewound
Mis-frame
Gen. Con. of Reel 1.....
Gen. Con. of Reel 2.....
Gen. Con. of Reel 3.....

*As used by Local 338, Watertown, N. Y., to improve
condition of prints.*

Gen. Con. of Reel 4.....
Gen. Con. of Reel 5.....
Gen. Con. of Reel 6.....
Gen. Con. of Reel 7.....
Gen. Con. of Reel 8.....
Gen. Con. of Reel 9.....
Remarks:
News-Reel
Comedy
Short Subjects.....
.....
Manager Projectionist

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Tools You Need

The following list of tools necessary in a projection room was compiled by Frank Neely of the Roxy Theatre, New York City, and is representative of the tools available in that projection room. Although this list covers the requirements of a large theatre projection room, a smaller house should, with possibly one or two exceptions, be equipped similarly.

Assorted sizes of screw drivers.

Pliers:

- 1 pair large cutting pliers.
- 1 diagonal cutter.
- 1 small pair of long-nosed pliers for wiring.
- 2 pair gas pliers.

Automatic center punch.

Assorted files.

Drills:

- 1 breast drill.
- Ordinary drills.

Test lamp.

Hacksaw.

1 pair snips.

Brushes.

Wrenches: Adjustable and open end.

Sand paper.

1 set of taps.

1 Set of dies.

1 set of socket wrenches.

1 torch.

1 electric soldering iron.

1 level.

Surface gauges.

1 hammer.

Brown and Sharpe, wire gauge;
screen thread gauge.

Polishing head, with emery wheel,
buffer and chuck.

Oil can; oil.

1 micrometer.

Assorted machine screws and nuts.

1 hand (or power) bench drill.

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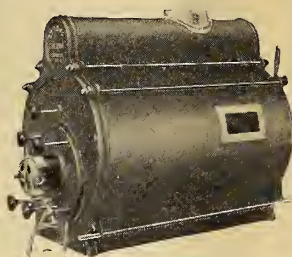
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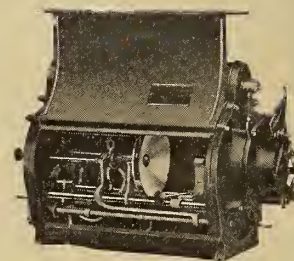
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Motion Picture News

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Vol. XXXVII
No. 1

New York

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TIMES SQUARE, N. Y.

HARRY RUBIN, *Supervisor of Projection Publix Theatres*

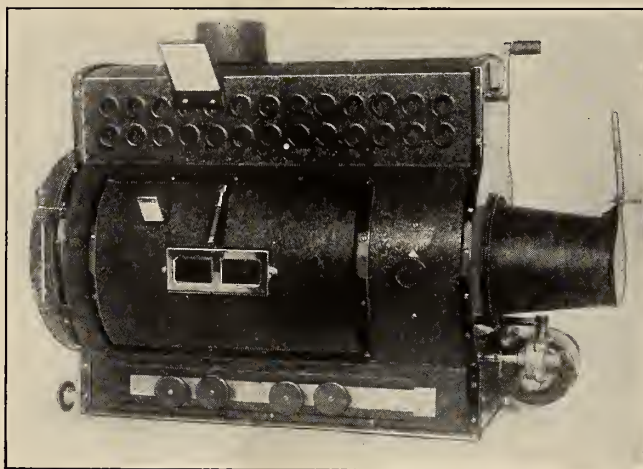
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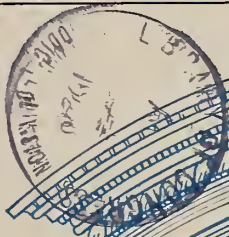
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PROJECTION and The Human Eye

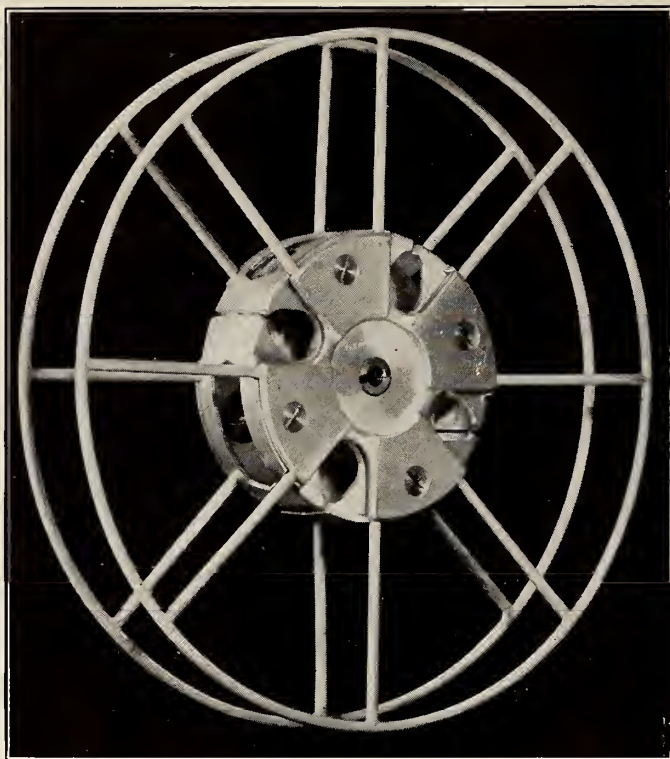
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Letters From Readers

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MOTION PICTURE PROJECTIONIST:

Please allow me to express my appreciation of our magazine. It ranks with the best craft magazines published, and I wouldn't miss one for anything. Please note change of address below. Best wishes.—H. C. FUSTON, Waco, Texas.

EDITOR,
MOTION PICTURE PROJECTIONIST:

May I please say a word in reference to what I consider the outstanding feature of our magazine? Your articles are fine, you have many good illustrations and your magazine is a fine job throughout, standing second to no craft paper. But I consider the section "What Projectionists Are Doing" the feature of the magazine. After I have read your very beneficial articles I like to turn to the above-mentioned section and there hear about things projectionists are doing throughout the country. To me, these notes are most interesting and make fine reading. This section provides a common meeting place for the interchange of ideas and news between the various Locals, and every month you should have notes from every Local. They owe it to you and to themselves to contribute to this section.—PAUL HIRSCH, New York, N. Y.

EDITOR,
MOTION PICTURE PROJECTIONIST:

Enclosed please find subscriptions to our fine paper. I can't understand why any projectionist should not subscribe for your paper, and I regard so doing as an obligation on every projectionist everywhere. They certainly owe it to you to support the PROJECTIONIST.—C. E. CURLE, Secretary, Local 259, Chattanooga, Tenn.

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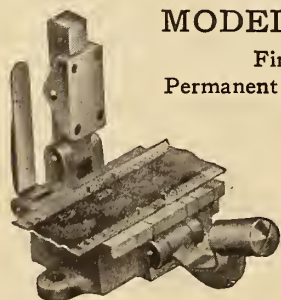
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Recently I came across an issue of your excellent magazine. As a publication for projectionists, it sure has plenty of IT. I have had only time enough to sketch over the issue, but if the succeeding numbers are half as good, the magazine will go over as big as "Wings." Enclosed please find my check for \$3.00 for a TWO YEAR subscription. If possible, please send me all previous issues.—C. R. PIEPER, Newark, N. J.

EDITOR,
MOTION PICTURE PROJECTIONIST:

Enclosed you will find copy from this Local for our wonderful magazine which gets better and better with each issue. Best wishes.—C. K. PETERS, Jr., Sec.-Treas., Local 548, Greenville, Texas.

EDITOR,
MOTION PICTURE PROJECTIONIST:

Herewith please find subscriptions for your very excellent magazine. I have no doubt but that this Local will soon be 100 per cent on your subscription list.—D. B. MACKENZIE, Secretary, Local 302, Calgary, Alberta, Canada.

EDITOR,
MOTION PICTURE PROJECTIONIST:

I will do all I can to help your very fine magazine. If succeeding issues match the quality of the first ones, then we all have something to look forward to.—GEORGE H. JONES, Secretary, Local 173, Toronto, Canada.

Editor,
MOTION PICTURE PROJECTIONIST

Sir:—In looking over Paul Ament's article on uniform cue sheets in your February issue, I would say that his style of cue sheet is very good and very simple. And he should know cue sheets, for he is, like myself, an old timer. I would suggest that you, as the editor of this paper, try your utmost to form a committee and, with yourself as chairman, hold a series of meetings looking to the establishment of a uniform cue sheet. I am sure that from the Metropolitan district can be drawn a personnel qualified by experience to arrive at a satisfactory conclusion to this vexing problem. And the meetings need not be dominated by Eastern men, for the boys in the West, in the South and in Canada could send along their suggestions for consideration.—A.W. FRIED, Brooklyn, N. Y.

THE MOTION PICTURE PROJECTIONIST

A Magazine Devoted to Projection and Projectionists

APRIL 1928

Founded 1927

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JAMES J. FINN, *Managing Editor*

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J. J. KIELEY } *Advisory Editors*

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What Projectionists Are Doing

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Note: The Motion Picture Projectionist does not assume responsibility for the statements and opinions appearing in signed articles in its columns. The leading experts in each phase of projection are asked to contribute and they are free to express their own theories and experiences. Accuracy alone is insisted upon.

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Projection and the Human Eye

By HUGO J. LITTLETON

THE field of projection has one principal purpose, that is, to project as perfect a picture as is possible on the screen, which is the medium of transmission into the human eye. We will find that in the chain of factors which build up projection that the human eye is the final link and upon its judgment stands or falls the results achieved by every part of the projection.

It is appropriate, therefore, to begin the study of projection problems with the reactions of the eye to the light. By doing this we discover that the laws which govern the functions and processes of physical objects are not always applicable to the functions and processes of the human eye. For example, a screen illuminated by a 120-ampere arc will not appear to the eye twice as bright as a screen illuminated by a 60-ampere arc. The effect on the eye of a screen illuminated by a 120-ampere arc will be much less than double the effect produced by a 60-ampere arc.

The most important quality of the human eye with regard to projection is undoubtedly the fact that the sensation of light persists after the light has quite ceased. This factor makes motion pictures possible. As every projectionist is acquainted with this phenomenon, we will proceed to investigate the relationship which exists between the light stimulus and its effect upon the eye.

Intensity of Sensation

Previously we have noted that the reaction of the eye to light, i.e., the sensation produced by a light source, does not change proportionately to the intensity of the source. The change occurs much slower and takes place according to a certain law, first discovered by Fechner.¹ The following table contains figures computed on the basis of that law:

| | | | | | | | | | | | | | | | |
|--|----|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|
| Intensity of Source: | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| Intensity of Sensation { Produced by Source { | 1 | 1.30 | 1.48 | 1.60 | 1.70 | 1.78 | 1.85 | 1.90 | 1.95 | 2 | 2.04 | 2.08 | 2.11 | 2.15 | 2.18 |

By studying this table we can deduce very interesting information which might be of real practical help in solving certain problems of projection. For example: we compare a screen illuminated by a 10-ampere arc with a screen illuminated by a 100-ampere arc (all other factors being equal in both cases), and we will find that while the intensity of the light on the screen in the second case is 10 times the intensity produced in the first instance, the sensation effect on the eye is only double. This fact may be somewhat surprising, but we have to keep in mind that a small increase in the intensity of the sensation affects the visibility of a picture considerably.

Visibility

The visibility of an object, or the clearness with which the eye can see details, depends on two main factors: first, the brightness, and second, the size of the object observed.

In projection work we observe on the screen a picture consisting of lighter and darker portions. A picture's clearness depends namely on how well we are able to detect differences in brightness. If we perceive small differences

with ease, we are looking at a properly illuminated screen. The best results will not be obtained at maximum brightness but rather at point which lies between very high and low intensity of illumination. In general, we are able to perceive differences of 1 per cent.

The proper brightness of the screen is an outstanding factor in screen results, as a change in brightness affects the clearness of the picture much more than a change in distance of observation. Screen-brightnesses today are still so varied that they are far from being standardized. As we will see later that the brightness of the screen is a constant that is independent of viewing distance, it ought to be possible to establish a standard of average brightness.²

Let us suppose that we are looking at a screen that is 1 square foot in size, with the distance from our eye to the screen being 5 feet. Now we retreat and go back to a distance of 10 feet from the screen, and we find that the brightness of the screen has not changed so long as we view the screen in the same angle of direction. This phenomenon can be explained only by citing the peculiar construction of the eye.

In Fig. 1, E_1 represents an eye looking at a screen, O_1 . The picture of the screen (O_1) is projected through the lens of the eye on the retina (R_1) which is that part of the eye which is sensitive to light. In the same figure we find an eye, E_2 , looking at a screen, O_2 (of the same size as O_1) at a distance twice as long as in the previous case. The picture of the screen (O_2) is represented by a heavy line (R_2). Comparing both eyes, we will notice that the picture of the screen (O_2) in the eye (E_2) is $\frac{1}{4}$ in size of the picture in eye E_1 . As the quantity of light at a distance of 10 feet compared with the quantity at a distance of 5 feet has decreased in the same proportion as

the size of the screen in the eye, we understand that the brightness stays the same.

The second factor determining the clearness of the picture is its size. In the foregoing we saw that brightness is a constant for all distances; still, everyone knows that the visibility of a picture decreases when looking at it from far off. If one of the factors which decide visibility is constant, the other must be variable. In the following, therefore, we will investigate the manner in which the visibility of an object is dependent on the size of the object observed.

The size of any object we see is determined by the angle from which we look at it—called the *visual angle*. For every object we see there are certain limits within which

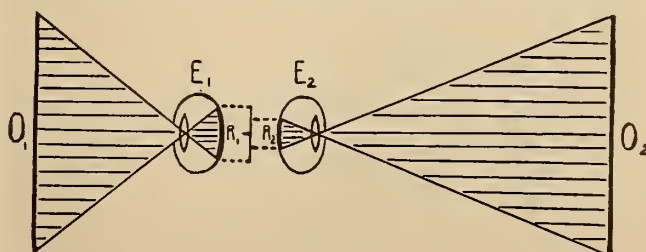


Fig. 1

¹ Differences in sensation vary as the logarithm of the stimulus producing the sensation.

² A committee on glare of the Illuminating Engineer Society in 1917, set the average illumination at 2.5 candles per square ft.

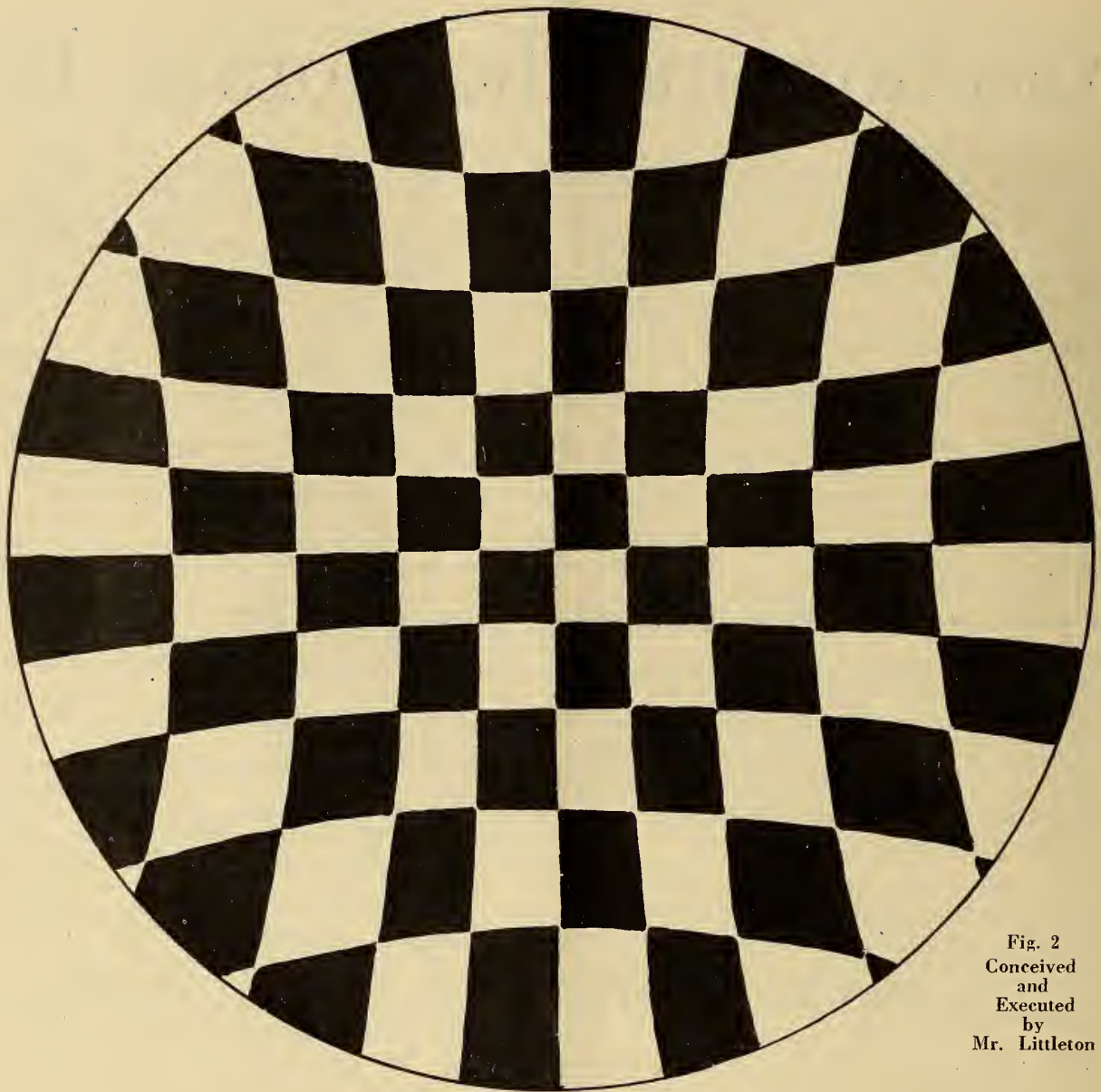


Fig. 2
Conceived
and
Executed
by
Mr. Littleton

we can see that object clearly. In the case of a projection screen, we are interested in knowing how close we can view a picture without encountering distortion, or at how far away we still are able to distinguish small details, such as subtitles. Within these limits the visibility may change considerably, but maximum visibility is dependent simply on the visual angle with which our eyes see things with utmost clearness. This angle naturally varies for different people, and for this reason it is impossible to determine the point of greatest clearness for everybody.

The shortest viewing distance lies at a distance equal to at least the full width of the screen.

In Fig. 2 you will notice the effect of viewing an object too closely. When gazing steadily at the center of the circle at a short distance from the surface, the curved lines in that figure will appear as straight. The explanation for this is that while we are looking at a flat surface the picture in the eye is projected on a concave sensitive retina which transmits the light impulses to our brain. If we were looking at a circle with straight lines in the same manner they would appear curved, which circumstance is equal to the effect produced by looking at a normally proportioned picture on a screen too closely.

The farthest distance at which we can see small details on a screen can be determined with much more accuracy than the shortest distance.

The average eye can still distinguish between small details as long as the visual angle with which we look at them is not less than $2\frac{1}{2}$ minutes (1 minute being $1/60$ of one degree). If we wish to find the farthest viewing distance of a picture we have to base our calculations on the distance between small details on the screen, such as subtitles. For example: the distance between a double I could be very well used as a basis. From measurements I have made on a screen of 10-ft. width, this distance was 1 inch; for a screen of 20-ft. width it would be 2 inches. In the following table are indicated the farthest distances at which subtitles still are clearly visible:—

| | | | | |
|------------------------------------|-----|-----|-----|-----|
| Size of screen-width (in ft.)..... | 10 | 15 | 20 | 25 |
| Farthest viewing distance (in ft.) | 115 | 172 | 230 | 286 |

What has been said above may very well be applied practically. Let us consider a theatre in which the rear seats are located 170 ft. from the screen. According to the above table, the screen must be 15 ft. in width in order that the subtitles may be clearly visible. In practice we employ a rather larger than the minimum-sized screen. After we know the width of the picture to be used, we find its area in square feet by multiplying the square of the width by $29/32$. Multiplying the area in square feet

(Continued on page 19)

When Ordering Simplex or Kaplan
Sure-Fit Parts

Use These Numbers

By JOHN PROSS

IN the stock of knowledge which a Projectionist should have at his command I know of nothing more important than a precise knowledge of the parts that make up any of the several assemblies of a motion picture projection machine. Such a knowledge is useful for many reasons. It not only helps the Projectionist to go at once to those parts that might be the cause for some sudden "kink" which is hindering the perfect projection of the picture, but, what is equally important, it enables him at once to order the exact part which may have to be replaced in an emergency—sometimes, perhaps, while

the screen is dark and the audience is waiting impatiently for the picture to go on again.

My own experience has taught me that such knowledge of this sort as I possess is my most valuable equipment as a Projectionist. Many times when I have had a breakdown in my mechanism I have been able to locate the faulty part and order it by telephone from the nearest supply house. Once I had a *travel ghost* due to a very peculiar and puzzling cause—the house was of the extreme de luxe type and any faulty projection created a furor from manager to doorman—and I was able to locate the trouble at once in a relatively small, hidden part whose washer and screw had worn a little loose. I do not say this boastfully—there are Projectionists all over the country who have an intimate knowledge of their projection machines—but I am merely citing these examples of how necessary it is to know all the parts and know them by name.

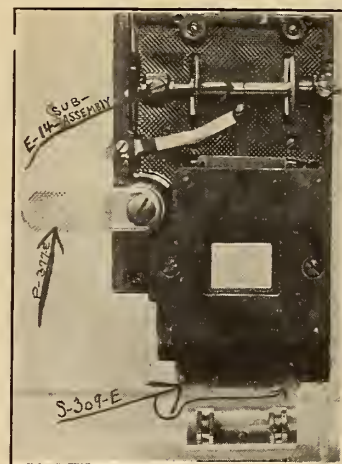
Before I attempt to explain how easy it is to order parts properly from your supply dealer, let me give you my impression of a Projectionist who lacks this valuable knowledge trying to order same part he needs—and maybe needs right away. I have heard it this way many times. He comes into the store:—

"I want a spring," he says.

"What spring do you mean?" the dealer asks.

"It goes into my Film Trap," says the Projectionist.

"There are several different springs that go into the Film Trap Assembly," answers the dealer. "Can you tell me what sub-assembly it belongs to?"



Film Trap Assembly

Imagine the trouble, the delay, the irritation and the general inconvenience of the whole transaction.

Now let's see how easily it can be done the right way—if the Projectionist knows how. Let us take the same Film Trap Assembly.

The Film Trap Assembly is known in the trade as the "E" Assembly. The "E" assembly in turn is made up of a number of sub-assemblies, fifteen in all, numbered from 2 to 18. No. 1 stands for the Film Trap Assembly complete as a single unit.

It is, however, not necessary for the Projectionist to know the trade numbers of these sub-assemblies. Manufacturers have simplified it for

| Part No. | Description |
|--|--|
| "E" FILM TRAP ASSEMBLY COMPLETE | |
| Complete "E" Sub-Assemblies | |
| E-2 Door Holder Assembly | |
| H-119-E Holder: | Door Holder |
| P-119-E Pin: | Door Holder Pin (2). |
| S-367-E Stud: | Door Holder Stud |
| W-148-E Washer: | Door Holder Washer |
| E-3 Intermittent Film Guide Assembly | |
| C-127-E Collar: | Intermittent Film Guide Distance Collar (4). |
| G-125-E Guide: | Intermittent Film Guide, Inside (2). |
| G-126-E Guide: | Intermittent Film Guide, Outside (2). |
| S-665-E Stud: | Intermittent Film Guide Stud (4). |
| S-716-E Screw: | Intermittent Film Guide Screw (4). |
| E-4 Film Trap Door (Old Style) | |
| E-6 Automatic Fire Shutter and Lift Link Assembly | |
| L-109-E Link: | Automatic Fire Shutter Lift Link |
| S-316-E Shutter: | Automatic Fire Shutter |
| S-362-E Stud: | Automatic Fire Shutter Stud |
| E-7 Automatic Fire Shutter Lift Lever Assembly | |
| L-101-E Lever: | Automatic Fire Shutter Lift Lever |
| S-363-E Stud: | Automatic Fire Shutter Lift Lever Stud |
| E-8 Automatic Fire Shutter and Lever Assembled (Includes E-6 and E-7) | |
| S-102-E Screw | Automatic Fire Shutter Lift Link Retain Screw |
| E-9 Film Trap Gate Complete (Old Style) (Includes E-3 and E-4) | |
| H-118-E Holder: | Guide Holder |
| P-100-E Pad: | Film Trap Door Pad |
| P-320-E Protector: | Film Protector Regular |
| S-130-E Screw: | Film Guide Holder Screw (8). |
| S-132-E Screw: | Film Guide Retain Spring Screw |
| S-192-D Screw: | Film Protector Screw (2). |
| S-310-E Shoe: | Film Trap Door Shoe, Left |
| S-311-E Shoe: | Film Trap Door Shoe, Right |
| S-326-E Spring: | Film Guide Retaining Spring |
| S-328-E Spring: | Film Trap Door Pad Spring |
| E-10 Double Tension Film Trap Door Assembly (Includes E-3 and E-17) | |
| H-118-E Holder: | Guide Holder |
| P-100-E Pad: | Film Trap Door Pad |
| P-325-E Protector: | Film Protector |
| S-130-E Screw: | Film Guide Holder Screw (8). |
| S-132-E Screw: | Film Guide Retaining Spring Screw |
| S-326-E Spring: | Film Guide Retaining Spring |
| S-328-E Spring: | Film Trap Door Pad Spring |
| S-580-E Shoe: | Double Tension Film Trap Door Shoe (2). |
| S-581-E Spring: | Double Tension Film Trap Door Shoe Spring (2). |
| S-698-E Screw: | Film Protector Screw (2). |

This is the first of a series of articles which will be continued in forthcoming issues in which complete trade numbers of Simplex and Kaplan Sure-Fit projector parts will be listed.

THE MOTION PICTURE PROJECTIONIST is always searching for information that will be of value to its readers and to the craft generally. Material is being sought from every source—whoever has anything to say that will help to increase the knowledge and experience of the craft is solicited for material.

In line with this policy, when it was suggested that we publish the trade numbers of the various parts of the projection machine in order to familiarize projectionists with them, we immediately requested Mr. Pross to prepare such an article. Mr. Pross' ability to do this may be gauged by this statement:—In a room full of projector parts scattered aimlessly about, one has only to give him the name of the part or its trade number and he will produce it immediately.

We hope that this series will be of real help to our readers in the future when ordering Simplex or Sure-Fit parts.—The Editor.

themselves and for him by giving every single part in the "E" assembly a number, so that it is identified at once.

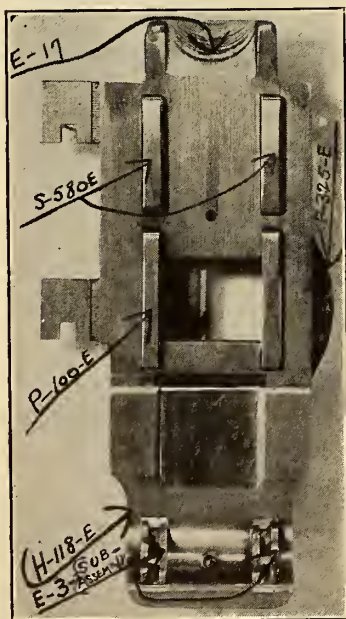
In addition they have supplied two letters which together with the number identifies the particular part from all the other parts in the projector.

For example, let us say that you need a new Film Trap Door Pad Spring. You phone, write or call for the part in the following manner:

S-328-E.

S stands for spring. 328 stands for the particular spring you want. E stands for the "E" assembly. Thus you want spring number 328 of the "E" assembly.

Another example. Suppose you want a Guide Holder in the Film Trap Assembly. Then you call for H-118-E.



Section of "E" Assembly

H stands for holder, identifying somewhat the particular piece you want. If you want H, the dealer will not be looking for springs or any other parts, but his mind will at once think of all the parts that begin with H. The number 118 stands for the particular part and E for the "E" assembly. He can pick it out at once, wrap it up and have it delivered to you in quick time.

Obviously it is necessary that the Projectionist acquaint himself with the various assemblies and have some handy guide to pick out the proper trade number for the part he wants. My advice is to try it as soon as THE MOTION PICTURE PROJECTIONIST has published the assemblies complete, and then see what a lot of time and effort it saves and what a lot of satisfaction it gives.

Important Note: Part S-310-E, called Film Trap Door Shoe, Left, and Part S-311-E, called Film Trap Door Shoe, Right, are used on the Old Style Film Gate and are replaced by Part S-580-E on the new style Film Gate. In ordering these parts order either for the old or new style Film Gate.

| Part No. | | Complete "E" Sub-Assemblies (Continued) |
|------------------|-----------------|--|
| | | Description |
| | E-13 | Film Trap Asbestos Heat Shield (New Style) |
| N-132-U | Nut: | Heat Shield Nut (4). |
| S-651-E | Shield: | Film Trap Back Heat Shield |
| S-652-E | Shield: | Film Trap Front Heat Shield |
| S-653-E | Screw: | Heat Shield Screw (6). |
| | E-14 | Lateral Guide Roller Assembly (Includes E-15) |
| C-129-E | Collar: | Lateral Guide Roller Shaft Collar |
| R-214-E | Roller: | Lateral Guide Roller (2). |
| S-763-E | Screw: | Lateral Guide Roller Shaft Collar Screw |
| S-762-E | Spring: | Guide Roller Spring |
| | E-15 | Lateral Guide Roller Shaft and Washer (Includes 2-P-359-E) |
| S-764-E | Shaft: | Lateral Guide Roller Shaft |
| W-198-E | Washer: | Guide Roller Spring Retain Washer |
| | E-16 | Film Trap Only |
| | E-17 | Double Tension Film Trap Door Only |
| | E-18 | Asbestos Heat Shield (Old Style) (With cut-out for old style Right Back Drum Cover Latch Knob) |
| N-132-U | Nut: | Heat Shield Nut |
| S-651-E | Shield: | Film Trap Back Heat Shield |
| S-652-E | Shield: | Film Trap Front Heat Shield |
| S-653-E | Screw: | Heat Shield Screw (6). |
| "E" PARTS | | |
| P-131-E | Plate: | Aperture Plate |
| P-131-E | Plate: | Aperture Plate (Undersize) |
| P-359-E | Pivot: | Guide Roller Pivot |
| P-377-E | Plate: | Thumb Plate |
| S-100-E | Screw: | Lever Pivot Screw |
| S-161-E | Screw: | Fire Shutter Stop Screw |
| S-309-E | Shoe: | Film Trap Shoe |
| S-327-E | Spring: | Door Holder Spring |
| S-432-E | Screw: | Film Trap Shoe Screw |
| S-434-E | Screw: | Aperture Plate Retaining Screw |
| S-787-E | Screw: | Thumb Plate Screw |
| T-101-E | Thimble: | Film Trap Door Thimble |
| D-103-E | Distance Piece: | Guide Roller Distance Piece |
| S-313-E | Shoe: | Intermittent Sprocket Shoe, Right (Old Style) |
| S-314-E | Shoe: | Intermittent Sprocket Shoe, Left (Old Style) |
| S-486-E | Shoe: | Film Trap Shoe, Right, Type "B" |
| S-487-E | Shoe: | Film Trap Shoe, Left, Type "B" |
| S-488-E | Shoe: | Film Trap Shoe, Right, Type "A" |
| S-489-E | Shoe: | Film Trap Shoe, Left, Type "A" |
| S-136-E | Screw: | Screw for Type "B" Film Trap Shoe |
| S-177-E | Screw: | Collar Screw |
| S-292-E | Shaft: | Guide Roller Shaft (Old Style) |

A. C. Motors

By JAMES R. CAMERON

ALTERNATING current motors may be either single or polyphase, the latter term including, of course, both two and three-phase motors.

Whether single or polyphase, they should be divided into two general classes, namely, synchronous and non-synchronous motors or induction (sometimes called asynchronous motors).

The Synchronous Motor

The synchronous motor is practically identical in construction with an alternating current dynamo, and the field magnets must be excited by a continuous current. A synchronous motor is not self starting, that is to say, it will not start by itself when current is switched on to the armature, even though the field magnets are excited. It is generally necessary after exciting the field to bring the armature up to synchronism with the supply before switching in; in fact, starting a synchronous motor is practically identical with switching an alternating current dynamo into parallel with other machines. When once started, the machine will continue to run and keep step with the supply. So long, therefore, as the frequency of supply remains constant, the motor will maintain an absolutely constant speed. A very heavy overload put on the machine, sufficient to put it out of step with the supply current, would pull the motor up.

Alternating current motors cannot be wound for any speed, as is the case with continuous current motors, the speed depending upon the frequency of supply and the number of poles in the field, just in the same way as the frequency of an alternating current dynamo depends upon the number of poles and the speed. Knowing the periodicity of the supply and the number of poles in the field, the speed of a synchronous motor is found by multiplying the frequency by 60 and dividing by the number of pairs of poles. Thus, the speed of a six-pole motor running on a periodicity of 100 would be

$$\frac{100 \times 60}{3} = 2000$$

For a given frequency, therefore, the speed is inversely proportional to the number of pairs of poles.

Synchronous motors are generally used only in connection with sub-stations of public supply systems, owing to the difficulty of starting and the necessity for a supply of continuous current for exciting the fields. For ordinary purposes, such as driving machinery, the non-synchronous type is used, more commonly called the induction type. An induction motor does not need a continuous current for exciting the fields, but works entirely from the alternating mains.

The advantages of the synchronous motor are its high efficiency and power factor. By over exciting the fields, such a motor can be made to improve the power factor of the supply system, as it takes a leading instead of a lagging current.

The Induction Motor

Electric currents are generated in any conductor which is swept or cut by magnetic lines of force. A simple method of demonstrating this is to rotate a thin disc of copper over a strong compass needle. The copper disc is

swept by the lines of force from the compass needle, and eddy currents are therefore generated in the disc. These circulating currents in the copper disc produce a magnetic field of their own and attract the poles of the compass needle, causing it to rotate in the same direction as the disc's rotation.

The operation might be reversed by rotating the compass needle near the copper disc. Eddy currents would be induced in the copper which would then tend to rotate in the same direction as that of the compass needle. A compass needle is, no doubt, far too weak to cause any movement in the copper disc, but if replaced by a strong magnet a powerful rotative effort may be produced. The disc would rotate, due to the rotating magnetic field induced in it by the magnet, and illustrate in a crude way the principle of the induction motor.

If we take an ordinary dynamo and short-circuit the whole of the commutator by slipping a copper ring right over it, we shall find on running it in its magnetic field that although we cannot get any current from it, it takes as much or more power to drive it as if it were developing its full output. The fact that the armature is generating heavy currents in the short circuited windings, which produce their own magnetic field, causing the armature to act like a powerful dynamic brake. The currents are due, of course, to the fact that the armature coils are revolved in a magnetic field, and the armature would soon get hot under these conditions. If, instead of mechanically driving the armature, we could revolve the magnets round it, currents would be generated in the windings, and these would produce a magnetic field which would cause the armature to revolve in the same direction as the magnets.

If the armature were running light, its speed would be almost equal to that of the magnets, so that its rate of cutting lines of force would be low, and the currents therefore would be small. It is obvious that the armature could not run at quite the same speed as the magnets, for then there would be no cutting of lines of force at all, and therefore no induced currents to cause the rotation. If, now, we apply a load to the armature tending to slow it down, there will be a greater number of lines of force cut per second and larger currents induced in the armature.

The greater the difference in speed between the armature and the magnets the greater will be the induced currents and the greater the attractive force between the magnets and armature. Such an arrangement constitutes a kind of electromagnetic coupling without any rigid connection between the two parts. There would always be a certain amount of slip between them depending upon the load put on the armature side of the coupling, and the current induced would be roughly proportional to the load.

By varying the current in the magnets, the armature could be made to slip more or less and so we should obtain a variable speed electric coupling.

Now if this description has been made clear, the principle of the alternating current induction motor will be easily grasped. Instead of revolving the magnets we can wind the field in sections and then send currents through the sections one after the other, and so cause the magnetic polarity to travel round the stationary field magnets, producing the same effect as though they themselves were

revolving. This is exactly what a two or three-phase current does. The magnets are wound in two or three groups, each group having the correct number of poles for the speed required. The effect of sending a two or three-phase current into the fixed coils is to produce a revolving field. This induces current in the closed coils of the armature, causing it to revolve at a speed slightly slower than that of the field. When load is applied to the revolving portion, the speed is decreased, thus causing greater currents to pass and producing a greater pull or torque.

The speed of the revolving field is proportional to the frequency divided by the number of pairs of poles. As the frequency is given in terms of alternations per second, we must multiply by 60 to get revolutions per minute. Thus on a circuit having a frequency or periodicity of 50, the speed of a two-pole induction motor would be 50 revolutions per second, or 3,000 per minute. A four-pole motor would run at half this speed, and so on. The full-load speed would be about 5 per cent below this. The fixed portion is not called the *magnets*, as in a direct-current machine, but the *stator*, and the revolving portion is called the *rotor*.

The revolving part, or *rotor*, consists generally of a slotted core, very similar to the slotted core of a continuous current armature, on which coils of wire or copper bars are placed, constituting the rotor winding. These windings are not brought out to a commutator, but are either closed on themselves or brought out to slip rings similar to the slip rings on an alternating current dynamo. When slip rings are not used, the rotor winding usually consists of copper bars laid in the slots and joined together at each end by means of a metal ring, the winding having the appearance, if the iron were not there, of the common mouse mill or squirrel cage. For this reason a rotor of this kind is frequently referred to as a squirrel-cage rotor.

The *stator*, as it is called, is built up of discs slotted to receive the coils, much in the same way as the armature of a revolving field alternator. Without its winding the stator resembles an internally-toothed gear wheel.

Polyphase motors are usually two or three-phase, the latter being more numerous.

In a three-phase motor there are three sets of coils on the stator, each set forming a single-phase winding, arranged to produce 2, 4, 6, 8, or more poles, depending upon the speed required. The coils are connected together in a star or mesh grouping. *Star* grouping is the most usual, one end of each group being brought out to a terminal, the other ends being all joined to a common terminal. In some machines, however, six terminals are provided, the two ends of each of the three groups being brought out to terminals so that the coils may be either joined up in star or mesh. This arrangement also facilitates testing out the machines in case of leakage or *earth*. The advantage of the star over the mesh winding is that each limb of the star does not carry the full pressure, but only about $\frac{4}{7}$ ths, so reducing the risk of breakdown. Another advantage is that the middle point of the star can be grounded if desired.

It will be clear from the preceding description that there is no connection between the rotor and the supply mains, the only connection being to the stator.

It is further seen that with a squirrel-cage motor there are no brushes, slip rings, nor any sliding contact. Such a machine, therefore, is the simplest form of motor possible.

An induction motor of the two or three-phase type will take considerable overloads, up to 50 per cent and more. The speed falls as the load increases, and a point is reached at which the rotor is so far out of step with the revolving

field that it stops. This will occur at 10 to 15 per cent below the synchronous speed.

If, by any means, the rotor should acquire a speed greater than synchronous speed, it will return current to the line and assist neighboring motors. Such a state of things might occur with an elevator running up light or running down with a heavy load, and is really a safeguard, preventing the motor racing. This feature may be used for dynamic or regenerative braking.

Single-Phase Motors

If the above remarks on three-phase motors have been followed, it will not be difficult to follow the action of the single-phase induction motor. The rotor of a single-phase, squirrel-cage, motor is identical in construction with the three-phase rotor, in fact, the same rotor may be used in a single, two or three-phase field. The stator carcass is also the same, the only difference being in the windings. Let us first consider a two-pole, single-phase winding, having its poles, say, at the top and bottom of the carcass. With a frequency of 50, each pole will change from north to south and vice versa 50 times in a second, so that while we have a north pole at the top and south at the bottom at one instant, we shall have a south at the top and north at the bottom immediately succeeding it. This at first sight does not look much like a rotary field, but more like a vibrating field swinging right across the rotor. The field, however, may be looked upon as a rotary field rotating in both directions at the same time, that is, we may imagine half the field to travel clock-wise and half counter-clock-wise. If a rotor be placed in such a field it will not start revolving, because the rotary field in one direction counteracts that in the other direction.

If, however, the rotor is started in either direction it will be slightly more in phase with the rotary field which is traveling in the same direction than with the field rotating in the opposite direction. The rotary field, therefore, which is traveling in the same direction as the rotor, will tend to pull the latter more and more into step with it, and the motor will, therefore, speed up in the direction in which it is first started. A single-phase motor, however, would not start up at all against a load, and can only be started up light. On this account it is generally provided with a long pulley so as to drive by belt on to a fast and loose pulley on the driven shaft or machine. Or, instead of a fast and loose pulley, a clutch pulley is frequently used, which allows the motor to run light until it acquires its full speed, when the load can generally be put on by means of the clutch.

It is not possible to start a motor always by hand in order to give it its direction; and to overcome this difficulty, a single-phase motor is usually provided with an auxiliary winding moulded on the stator between the running coils, of comparatively high resistance, and also very high self-induction. In starting up the machine, the auxiliary starting coils, as well as the running coils, are in circuit, the high self-induction of the starting coils being such as to cause the current passing through them to lag 90° behind the current in the running coils. This method of winding is called a *split-phase* winding, that is to say, the phase is split up into two components, one at right angles to the other, producing in the motor the effect of a two-phase current, and the motor will start up under those conditions like a two-phase motor in a definite direction. The torque produced by the starting coils is, however, comparatively small, and is merely sufficient to give the motor its direction when running light. When the motor has acquired its full speed, the starting coils are cut out of the circuit, when the motor continues to run as a single-phase motor.

INTERNATIONAL ALLIANCE OF THEATRICAL STAGE EMPLOYES AND MOVING PICTURE MACHINE OPERATORS OF THE UNITED STATES AND CANADA, 1440 BROADWAY, NEW YORK CITY, N. Y.

New York, N. Y. December 8, 1927

Editor, The Motion Picture Projectionist, 45 West 45th St., New York, N. Y.

Sir:-

I have read the first issues of the Motion Picture Projectionist, and I wish to express to you my congratulations on a job well done. I consider your magazine the **FINEST OF ITS KIND I HAVE EVER SEEN**, and you are to be commended for your efforts in providing projectionists with such a splendid craft journal.

Containing, as it does, a wealth of information and instruction for projectionists everywhere, and compiled, edited and published in such workmanlike fashion, I am sure that your magazine will receive the support it so richly merits.

Please accept my best wishes for success in your venture.

Very truly yours,

(Signed) William F. Canavan

International President

WFC:H
BS&AU
12646

Kansas Locals Advertise Selves to Public

Three Locals in Kansas—Nos. 641 (Arkansas City), 368 (Hutchinson), and 414 (Wichita)—got together recently and turned out some very fine advertising for the Union projectionist and, incidentally, the Union Label.

The campaign was for the purpose of acquainting the public of these localities with the desirability of having a Union projectionist in charge of the projection room. The "safety" element was given dominance in the ads, and the Union projectionist's ability to render satisfactory service with safety was brought prominently to the fore.

Ads were inserted on three consecutive Sundays in the magazine section of *The Wichita Beacon*, a splendid choice, as this particular section is given over largely to comment on current films and the doings of the players. Almost certain to be read by the regular moviegoers of all three towns, the Locals' advertising probably succeeded in securing the attention of just those people whom it was intended it should reach, resulting in maximum effectiveness.

The ads occupied generous space, being 8" deep and 4½" wide. The ad copy was equally as good as that used in the Kansas City campaign, discussed in these columns recently, and differed but slightly in character, a natural result of featuring the "safety" cue. In all three in-

stances the Union Label appeared at the top-center of the ad, with the heading placed around it.

The border on the ads was a heavy black rule broken at intervals to give the impression of a film.

These three Kansas locals are deserving of great credit for their ability to get together and put over a campaign of this sort. Following the publication of the Kansas City campaign in the January issue of *THE MOTION PICTURE PROJECTIONIST*, several Locals wrote in to say that they were anxious to launch a similar campaign in their localities, but the cost of advertising space in the newspapers was prohibitive. Last month there appeared in these columns a note on how Local 333 of Charleston, S. C., substituted newspaper advertising with a series of form letters sent out to a selected list.

Of course the cooperative efforts of three or more Locals is preferable, not only because of the lower costs to each Local but also because of the very much wider coverage that may be obtained.

It probably is impossible to trace any direct returns from this sort of advertising, yet it is undeniable that the good will accruing to projectionists, and, for that matter, to all Union Labor, from these campaigns is invaluable.

But whatever the returns, it is a splendid commentary on the craft when several units combine to do such work.

As *The* EDITOR Sees IT

O ¶ Your Growing Importance

ON page 34 of this issue we broadcast for the first time the news of the tremendous growth of THE MOTION PICTURE PROJECTIONIST. As our readers will note, 85 per cent. of all Projectionist Locals in the I. A. have sent in subscriptions and of these, 32 per cent. have sent in subscriptions covering their entire membership. In several cases the Local membership was not solicited individually. The paper was so well received that the body passed resolutions ordering the Local to subscribe for sufficient copies in bulk to take care of the whole membership. Our readers will also note that twenty-four manufacturers and distributors are represented in our advertising columns. In the next issues this number will reach thirty and every issue thereafter will see the lists of these alert equipment advertisers increase.

We cite these statistics because we consider them very significant to the growth of the mighty projectionist craft—because they are a measuring rod by which we can now reach several highly important conclusions. First, the avalanche of subscriptions that have kept pouring into these offices since the paper was begun (often at the rate of fifty a day) proves that members of the craft consider themselves definitely entitled to a place in the sun. They are alive to the demands made upon them daily for skill and precise knowledge and are capable of meeting these demands; hence they welcome this paper that so ably represents them to other sections of the industry and to enable this paper to continue its good work they are willing to support it nobly. On the other hand they make certain demands upon such a paper. They ask that it bring to them the very latest and most advanced information regarding mechanical and technical equipment; they ask that this information be imparted to them by acknowledged experts and that at all times it be complete and accurate. Such a policy was set forth in our initial number, and that we adhered to it as energetically as possible is proved by our big circulation list in this phenomenally short time.

Now we have come to another important aspect of the place of this craft paper among Projectionists. It concerns the attitude of the mass of equipment manufacturers toward the craft. Generally speaking, we encountered the most colossal indifference and the most stubborn resistance to any suggestion that Projectionists deserved the consideration of the equipment people. They held the short view that the exhibitor signed the purchase order and signed the check—hence the Projectionist was “small potatoes” when it came to buying new equipment. We all know how false this idea is. I venture to say that in at least eighty per cent of all theatres the Projectionist is consulted on new equipment. In many cases he suggests to the exhibitor that certain types of equipment would help his show and urges that it be got for him. The Projectionist is the silent factor—but he is there just the same, very powerful and very necessary to the equipment distributors.

I remember talking with one man who had just begun marketing a new device. He was having rather considerable success with it, too. Exhibitors looked very favorably upon it. His chief sales argument didn't embrace the Projectionist at all. He failed to see the value of advertising to them. I pointed out to him that maybe in time he would have sold one to every exhibitor in the country.

BUT—(and he saw that *but* at once), I pointed out to him that after the device was installed, if it didn't meet with the approval of the Projectionist, if he considered it an impediment in his projection room and a hindrance to perfect projection, out of the booth it would go, never to be replaced. If the lives of many thousands of men, women and children are intrusted to the Projectionist, he will insist on approving the materials he works with. There still are a considerable number of equipment people who are not yet sold on the idea of advertising to the craft. It is poor business.

I ¶ A Statement of Policy

I WISH to close this editorial with a resume of the policies and purposes of this paper so that it may forever be a matter of record in the files in the various Local offices and in the minds of the thousands of our subscriber-readers.

This paper is a private commercial enterprise, fostered by the desire to give the craft the best service in our power. Of course we will make money by advertising some day—because only in that way will we be able to continue to publish a paper for the craft. On the other hand, in order to retain the confidence of the craft we must continue to give the best paper possible. It does not rely on the support of a club or other sustenance to keep it going, nor is it published to help defray the expenses of such a club because it attracts too few members to sustain it by dues. The MOTION PICTURE PROJECTIONIST stands squarely on its own feet and has won the confidence of leaders and of the rank and file within projectionist ranks.

As experienced publishers we do not miss a trick on our desire to get the best information and pass it on quickly and accurately to the craft. We are not practical projectionists ourselves. But our editorial staff is—Lester Issac, Chief Supervisor of Projection for the Loew Circuit; Frank R. Day, Corresponding Secretary of Local 306, New York; Earl Denison, expert with United Artists; Jack Kieley, Vitaphone expert, and a large group of fine projectionists in and out of New York City who are always willing and anxious to give us every assistance possible. Adolph Zukor heads the biggest producing company in the world but he doesn't know how to direct a picture . . . We feel confident we are publishing a very useful magazine.

We intend to keep this paper free of all controversy. It is a technical paper. Neither in its columns, nor in speech shall we as its representatives ever meddle in the affairs of the Locals. We feel that Locals are very capable in the handling of these affairs without outside interference. How, for example, would your Local like it if, on the eve of a bitter wage scale controversy, someone, posing as a friend of the craft, were to mix into it—and not on your side!

Boone Manacall

Publisher and Editor.

Problems of a Projectionist*

By LEWIS M. TOWNSEND

THE problems of a projectionist are so numerous and so widely different in their nature that I have been very careful to keep the last word of the title of this article singular. If one were to attempt to write on the problems of projectionists in general, I fear he would never live to see the end of that one article.

We shall start with the receipt of a brand new film for previewing. The majority of film received at present is waxed by a good waxing machine which places a thin line of wax over the perforations. This wax is applied in a molten state, and no more is applied than is absolutely required. A few exchanges, however, persist in trying to apply cold paraffin to the film. The result is that eight or ten times as much wax is used as is necessary. This gums up the sprockets of the projector, lodges in the aperture, and makes a very displeasing grillwork along the sides of the projected picture. Quite often so much wax will spatter on the lens that it is necessary to stop in the middle of a picture to clean the lens. Later, the excess wax spreads over the entire film and very often discolours any toned portion. It is strange that exchanges will continue to ruin their own goods year after year in this manner.

I once received a print of "The Black Pirate" done throughout in Technicolor, with the usual amount of printed instructions to the projectionists to use care, caution, etc., in handling the film to prevent scratching. The print had not been through a projector more than two or three times, but the reels were in such a bent and dilapidated condition that we were forced to stop the projectors and have the feature rewound on good reels, before we could finish the preview. The last fifty or one hundred of each reel was so badly scratched at this early date in its life that we would have refused to use this particular print for a regular showing in the Eastman Theatre (Rochester).

Next we shall take the receipt of a feature or other film for showing, some five or six weeks after previewing. The punch-mark nuisance has abated somewhat but is still with us. We also have stickers of all shapes, sizes, and descriptions placed not only by projectionists but also by exchanges themselves. I believe that the only way to eliminate this nuisance and waste of film is for the producers to get together and adopt some safe and sane method of ending their reels so there will be no doubt as to when the end is coming. Some producers now arrange a fade-out at the end of each reel. This proves that it is possible. Other producers wilfully commit the blunder of ending one reel with a close-up of one person and starting the next reel with a close-up of another person. This is inexcusable.

I see no reason why they should not send out a cue sheet describing the action at the end of each reel. It may be well enough for the de-luxe houses to make their own cue sheets, as we do at the Eastman, but bear in mind that many, many theatres do not receive their film three or four days ahead of showing. Many are lucky to receive their show a few minutes before the theatre opens. Going further, I can see no reason at present for making leaders which will project "End of Part One,"

"Reel Two," etc., on the screen. Why not use opaque film for leaders and print this information in such a way that it can be read by the projectionist but will not be projected? Several feet of film and, what is more important, several feet of action are wasted daily by the cutting off and replacing of these leaders.

My problem at present in regard to film condition centers on scratched film. Unless film is absolutely first-run, scratches are always present in a greater or less degree. I believe that small reel hubs, high speed rewinds with poor tensioning devices, and worn magazine valves are the chief causes of scratching. I think that the adoption of the five-inch hub as standard would be very beneficial to the majority of theatres and only slightly objectionable to a small minority. You may say, "What about the portable projectors and small theatres that still use the small magazines?" I say, "Why cater to the minority when the vast majority would receive a direct and decided benefit?"

This unnecessary winding and rewinding on small hubbed reels causes more scratches than any other one thing. For a rewind we use two Simplex take-up brackets and lower magazines. The idler side is equipped with the regular take-up tensioning device. This is light and even. The driven side is geared in such a way that it takes four minutes to rewind a 1,000-foot reel of film, the hub being 5" in diameter. Near the reel onto which the film is wound a hard guide roller is mounted on an arm having a vertical swing. The roller guides the film evenly with no slopping sidewise. The swinging arm is arranged in such a way that when the end of the film goes through, or in case of a break, the arm drops on a radio plunger switch and stops the motor.

Instead of using 80 feet per minute as a standard projection speed, we project a picture at from 90 to 100 feet per minute. We have 120 minutes for the complete show. Subtract 10 minutes for overture and 10 minutes for an act or acts, and we have left 100 minutes for film. This will allow us to show approximately 9,000 feet of film. We pick the weekly to make about 800 feet; we reduce the comedy to about 1,200 feet, and take out about 1,000 feet from the feature. Each of these footages are approximate, bearing in mind that the whole show must not be much in excess of 9,000 feet. How do we do it?—by cutting.

It is no easy job. This is the way we go about it. The managing director, the musical director and I watch the picture through at the first preview, after which we confer as to what can be eliminated. At this time I estimate just how much the film will be reduced in footage. The speed and running time are then decided. I make an index card containing this information and file it. Later, when the picture is received for showing, I have it run over again and make the necessary cuts. This work usually takes six or seven hours. Producers and exchange managers object to having their pictures cut; but this will be done as long as they continue to make features much in excess of 7,000 feet or make comedies 2,000 feet in length which would be much better if only 1,000 feet long. Of course we do not cut 1,000 or 2,000 feet from some particular part of the picture. It is gone over,

* From S. M. P. E. Transactions, with permission

reel by reel, and we take out only minor incidents which have no direct bearing on the story, and unnecessary detail or padding, of which there is usually a great sufficiency.

In order to have a smooth-running show, free from breaks, it has been found necessary to inspect by hand all film included in the program. This is not done because of worn or defective perforations but on account of bad laboratory splices. Apparently the majority of laboratory splices are good. Features have been received from the largest producers in which poor cement has been used. I think this, however, mainly the result of improper handling. Many do not seem to realize that a loose cork will soon ruin an entire bottle of cement. On these apparently good splices, if you just pick up the corners of the joined parts, they will open up and with only slight effort they separate very easily. Frequently the cement looks and acts more like library paste. Hand inspection is the only remedy.

It is also necessary to remove a considerable quantity of oil, grease, and dirt from films as received, even if only five or six weeks old. This is done by hand. Pads of long nap silk velvet are made, and saturated with carbon tetrachloride. The film is run through these. An electric desk fan is trained on the film in such a way as to evaporate all surplus solvent from the film before it reaches the reel, two men being used for this work. One cleans the film, and he keeps the second man busy washing out the velvet pads. One piece will clean about 50 feet of film; then it must be washed out. This process takes about 30 minutes to a 1,000-foot reel or four hours to properly clean an eight-reel feature.

After inspection and cleaning, the film is wound on 2,000-foot reels for showing. To obviate the possibility of a man putting in the wrong reel or putting in a reel backwards (without rewinding), we have found it necessary to use plain white undeveloped film for leaders at the start of each reel with the number of the reel plainly punched on the leader, and to use a colored undeveloped leader (I use amber) at the finish of each reel. This might seem an unnecessary precaution, but several years ago an accident involving reels put in backwards happened, and I have taken no chances since.

Now let us say a few words in regard to organization and equipment. *Any theatre that desires to sell motion pictures to the public must do so through the medium of good projection.* This depends entirely upon the organization of the projection department and its equipment.

At the Eastman Theatre I am in full charge of the projectionists and equipment. I and no one else is held responsible for the projection. Although we have the best equipment money can buy, this would soon deteriorate unless properly cared for.

We now reach the point where the show goes to the main projection room for a week's regular run. During the time that the film has been in preparation, the designer, under my direction, has been working out special effects that will symbolize the different numbers on the program, such as weekly, comedy, feature, etc. All color and lighting effects are rehearsed, after which every detail is written out, including the speed, footage, and time of starting and ending of each number on the program. Only by the written method can we be sure that one show after another will be exactly alike. It is essential that every show be the same, even to the timing of color effects, which cover the curtains while they are closed between each number on the program, because these effects are also timed with the musical score.

We used to rely on hand inspection of the film to avoid breaks during the run of a show, but we have

since changed to the use of an inspection machine. Sensitivity of this machine is tested daily with a test film with all possible defects numbered in such a way that, if the machine fails to stop on any number, proper adjustment may be made at once. Without using the test film, the machine would hardly be reliable. It is necessary to run the film through this machine only once daily to insure against breaks.

Besides the nine projectors under the roof of the Eastman Theatre and Eastman School of Music, there are three in each of our other two theatres. Out of 15 projectors, 3 are equipped with high intensity arcs, six with reflector arcs, five with Mazda, and one with a regular arc. There are the following projection distances: 15, 25, 35, 80, 90, 100, and 160 feet. After many experiments, the white cloth screen with rubber backing seemed to give the best results under various conditions, and these are used throughout.

The high intensity arc is used on the 160-foot distance. The light from this was very unsatisfactory as to color and uniformity of screen brightness until the relay system was used. This increased our screen brightness 25 per cent in the center of the screen and 33 per cent on the corners. While the light has much less blue in proportion than before, it is still necessary to use correcting filters while projecting color films. With the Mazda also, it is true that a clear field was not obtained until the relay system was adopted.

This particular relay system uses an aperture lens, which is capable of converging the light beam into an objective lens of small diameter. The reflector arc, while it gives plenty of economical illumination, also delivers plenty of heat to the film. This heat in itself sets up many focus troubles which have been encountered by only a few projectionists before. The light beam in this case usually fills the objective lens to its full aperture, which tends to reduce the depth of focus. At the same time, the film is heated to such an extent that each separate picture buckles and bellies toward the light source (away from the objective). This buckling varies with the density of the film. Thus, a title with a black background will buckle most, and a letter written on a white background will buckle the least. These are the extremes. In between there are hundreds of different densities, each absorbing a different amount of heat and buckling accordingly. If the lens happens to be of short focus or especially large aperture, the only way to keep the projected picture in sharp focus is to refocus with each change of density. My only remedy is to use an objective lens of relatively small aperture. This assures enough depth of focus to take care of the buckling. In general, it is against my good judgment to use an objective that has a free aperture of more than F/3. At present we are able to get all the illumination required without resorting to exceptionally large aperture lenses and taking chances on losing sharpness and definition by so doing.

Looking ahead, I believe that in time the reflector arc will be replaced by an angle arc mounted back of six- or eight-inch diameter condensers in connection with a relay system using an aperture lens which will converge the light beam into a small aperture objective lens. I believe that the same system will be used with either high or low intensity carbons, as the condition may require. In connection with this, a revolving shutter located just back of the aperture (between the condensers and film), will of necessity be introduced. This would reduce the heat on the film by at least one-half. The shutter would also have the advantage of being a standard width for all sizes of objective lenses.

A Shorthand Cue Code

By H. R. JOHNSON

⊖ Man

⊕ Woman

U Lights Up

N Lights Down

⊥ Curtain Up, Sac Open

⊥ Curtain Down, Sac Closed.

V Red + Blue Up (Stage Lights)

Λ Red + Blue Down (" ")

+ Stage Black-out

⊥ Blind

X Exit

* Number

% Song

↪ Dance

Mr. Johnson's Cue Code

@ At Music

— Finish

⊥ Follow

↓ Down Stage

↑ Up Stage

12/ Indicating Entrance

⊖ Favor Worker

○ Spot

⊖ Opening

⊖ Comedian

⊖ Swing Spot

⊖ Enter Stage

⊖ Enter Spot

⊖ Hold Spot

⊖ Bows

⊖ Exit Out of Spot

> Draw Spot

< Spread to Flood

⊖ Baby Spot

□ Leader

② Cover Amount Indicated in Circle

7 Talk-Mono!

⊖ } Indicating Party
TRUM } Up or Down
CQR }

The accompanying cue sheets, together with the key to the symbols used in writing the cues, were contributed by H. R. Johnson of Evansville, Indiana.

Projectionists all over the country have displayed an avid interest on the subject of uniform cue sheets, and elsewhere in this issue the matter is discussed further by other projectionists.

Mr. Johnson's plan of using symbols to indicate the actors, their movements and the various lighting effects parallels the use of symbols in writing shorthand. The application of this method to the writing of cue sheets is quite novel and Mr. Johnson asks for it the serious

consideration of the craft. Following is what Mr. Johnson has to say about his method:

The discussion on uniform cues which appeared in recent issue of your publication is very interesting to us in Local 367, and particularly so to me. I am enclosing herewith a cue sheet code which has been used here for the past five years.

I have used this code in an Orpheum house here, and I have found it satisfactory in every respect. When you look at this code the chances are that you will say, "that fellow is having a pipe dream." Well, maybe so; but I stand by the method. Another objection likely to be advanced is that the code or "key" to the method is too complicated for anyone

(Continued on page 27)

A copy of the letter appearing below was sent to us by Projectionist G. J. Franck with the request that we give it publicity. We are glad to do so as the cause seems noteworthy.—THE EDITORS.

GALVESTON, Texas, April 3, 1928.

To all Locals of the International Alliance of Theatrical Stage Employees and Motion Picture Operators of the United States and Canada.

Dear Sirs and Brothers:

Please don't table this as it will benefit all of us in years to come.

In my travels around the country the last few years, my attention has brought me face to face with a problem that needs attention. I have met so many old men of the Alliance that need some place to go in their old age, some were stage employes and some were operators and in a few more years with our eyes burnt up from arc lamps and our lungs filled with gas from carbon, it is never too late to start something. So let's all get busy and see if the Alliance will stand an assessment of a dollar or two to build us a national home, so that the old timers will have a place to go. Just think, for a dollar around will build us a home and a few cents a week will keep it up. If all the Locals will endorse it what a great thing it will be.

I am sending a copy of this letter to all Locals of the Alliance so we can get it before the convention in Detroit in June. Let us at least bring it before the honorable body and see what they think about it. Please take some action in this, Brothers, as you see what it means to all of us.

Hoping to hear from the different Locals, I remain,

Yours truly,

BROTHER G. J. FRANCK,
Local 305—Box 305, Galveston, Texas.

Change-Over Cues

By E. J. SESSIONS

AT a recent meeting of projectionists it was suggested that steps be taken to improve and, if possible, standardize cue sheets. Before going into the question of spot cues, which were under discussion at the time, I would like to suggest a system for changeover cues—a system which has been in use for more than a dozen years and which is so simple, so easy and thoroughly effective that it has never been abandoned by any projectionist who has once used it.

This system is based upon the fact that it is almost impossible to find a ten-foot length of film without a change of scene or an entrance or an exit, and that scenes may be identified by the number of actors therein.

One thing that should be clear to all projectionists by now is that no one action *alone* is a changeover cue. The fellow who used to punch holes in the film didn't stop with one; the first one warned him that more were coming. To make a perfect changeover one must be warned that the cue is coming. "Dog" is not sufficient. "Man—house—dog" will get results.

In writing the cues, a simple Arabic numeral denotes the number of persons in the scene; a comma (,) is used to separate actions in one scene; a dash (—) to separate scenes; a double-dash (— —) to denote words left out; and quotation marks (" ") to indicate a subtitle (words quoted from the screen). One person alone is described as a "man," or "girl," etc. More than five persons is written "crowd."

Punctuation marks are not inserted to ornament the cue but to be read: thus, a comma (,) is read "same scene"; a dash (—) is read "next scene"; a double dash (— —) is read "and so forth"; and quotation marks (" ") are read "subtitle."

X is an easy abbreviation for exit, N for enter, F for fade, G for girl, M for man, and C for couple. These are the only abbreviations ever used, and unless they are plainly posted at the top of the cue sheet board above the slip where they cannot be covered, even those words are written out fully.

At least two, and preferably three, consecutive scenes or actions are noted—the last one written being the cue to shoot. Thus 3 would indicate three persons in the scene. 3XI would mean that of three persons in the scene, one had left the picture. 3,XI,F (three persons, exit one, fade) is a complete changeover cue. The projectionist notes three persons in the picture, stands ready while one makes an exit, and shoots as the scene fade.

To illustrate further:—one projectionist left the following cues for "The Garden of Allah":

End of reel 2. Subtitle—count 8 scenes and shoot.

End of reel 4. Subtitle—count 9 scenes and shoot.

Reel 2 ended with three men seated inside a railway carriage. Another man entered, and the reel ended. The next projectionist changed the "count 8" cue to 3,NI. In changing over, he noted the scene with the three men, and then shot as the fourth man entered. The Reel 4 cue was changed to "Hindu-Girl-Hindu-Man." He might have written "Englishman" to avoid insult to the man

with the turban; but at any rate he had a cue that was practical.

There are several mistakes commonly made in the writing of cues. Many projectionists are indefinite. For instance: "Woman leaving." One watches her leave a crowd, leave a house, leave the grounds, leave her lover—and then the boss wants to know why one showed the end of part six. The real cue in this case was C,XG (Couple, exit girl).

Another fault is that of imagination. The last three scenes are C—M—G (Couple—man—girl). One finds this written as "Girl looking at man." Or a reel ends with three men standing beside a fence; a sheriff enters the scene. Your good friend on the first shift has written "Man about to jump fence" because one of the men actually does jump the fence—in the next reel.

Of all the words ever put on a cue sheet, probably the one most misused is the word "exit." A character shown taking a few steps to one side is *not* making an exit; or the turning of a back to the camera is *not* an exit. Neither is a change of scene an exit. An exit is the actual leaving of a scene.

So many reels end with a confusing series of flashbacks showing one and then the other of two persons, that it is sometimes necessary to include an action. "G—G—G" would not mean as much as "Girl, rises, walks to mirror, pats hair." "M—M—M" would be confusing; but "Man—servant—man, lights cigarette" is clear. Other reels end with only a foot, or two feet, of film following a subtitle. The cue sheet should properly bear a warning line, thus—"Since I first—"—Couple (2 ft. only).

This system differs from the studio continuity in that the names of the actors and also the familiar "at table," "at boat," etc., are omitted. Compare the short and clear "3,NI—M" with the continuity cue "at table, Mary's father, mother and Lucien: Mary enters, shows doll—Lucien looking at Mary in astonishment."

Every projectionist should be familiar with the studio form, but in the projection room, brevity is more important than the man's name, or the thing not in the scene that one is supposed to see, or trying to figure out whether it is a sore toe or something else that causes a pained look on an actor's face.

The most important of all things with regard to cue sheets is that a clear definition of all abbreviations and technical terms used should be conspicuously posted with the sheet, and this is applicable to acts as well as to pictures.

To make a long story short, any projectionist who, beginning twenty feet from the end of the reel, will mark the number of actors with a number; the change of scene with a dash, followed by a number indicating the number of persons in the following scene; and mark all exits and entrances with an X or N, in addition to indicating the number of persons that go or come, will leave a cue sheet that will enable his partner to run a perfect show.

And, when one is finished with his cue sheet, it should not be discarded. Put it in the shipping case with the reels; the exchange will forward it to the next man. And why not?

Projection and the Human Eye

(Continued from page 8)

by the standard illumination per square foot we arrive at the total light quantity necessary to illuminate this given screen. If the screen is 15 ft. wide, its area is 204 square ft. multiplied by the assumed standard illumination of 2.5 candles per square foot; therefore the total light quantity emitted by the screen would be 204×2.5 , which is 510 lumens.³

Throughout this article I have held strictly to relations between the human eye and projection, keeping aside all problems not directly dependent on the characteristics of the eye. I did not, therefore, consider any special reflection qualities of different screens, nor any particular angle of viewing a picture.

Although the conclusions reached herein with regard to visibility of a picture may be applied to any screen surface, it must be remembered that in all cases we have only one line of direction of viewing the picture under consideration. Visual acuity or the clearness with which we see a picture depends on its brightness and the visual angle of viewing it. Brightness produces the best results at a point between very high and low intensity of illumination and remains constant in a certain line of direction, while the visual angle changes with the distance from the screen. The maximum acuity for a certain eye is dependent entirely on its visual angle at which it sees a picture with ease being different for different people.

Wherever a question as to the priority of the eye or the screen arises, we must consider that the screen brightness and its size have to be suited to the requirements of the eye, and *not* vice versa; i.e., the eye shall not be put to undue strain through a brightness either too low or too high, nor through an improperly sized screen, the latter being determined by the length of the theatre.

³ It is necessary to make further allowances when considering the width of a theatre, but the angle of viewing the picture from the side does not directly affect the eye, but first of all the brightness of the screen.

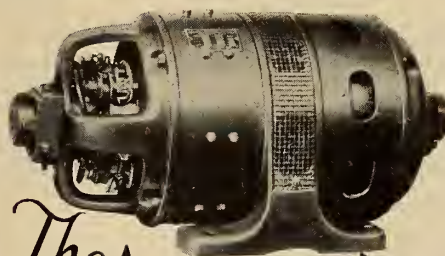
About Proper Screens

For the most efficient projection of a satisfactory picture a screen must be selected whose size and light distribution characteristics are such that it will most effectively direct the light to the audience so that the images there formed may be seen without effort from every seat.

A good rule to determine the picture or screen width is as follows: The minimum picture width should not be less than about $1/7$ the distance from the screen to the most remote seat, and the maximum width is such that the angle formed by the lines connecting the two sides of the picture and the eye of the observer in the first row does not exceed approximately 45 degrees. If the minimum requirement is exceeded, there will be such a concentration of detail that patrons seated in the rear of the house will have difficulty seeing clearly. Exceeding the maximum stipulation will make it necessary for those in the front rows to move their heads to scan the entire picture.

The height of the screen is $3/4$ its width, except in cases of picture distortion due to faulty location of the projection room.

The shape and seating arrangement of a theatre govern the choice of a screen surface. It is, of course, always desirable that the screen have a high reflection factor.



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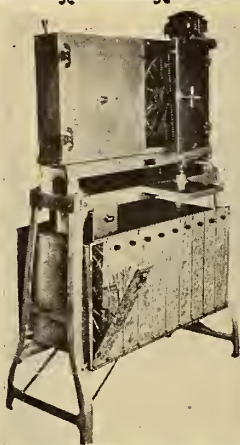
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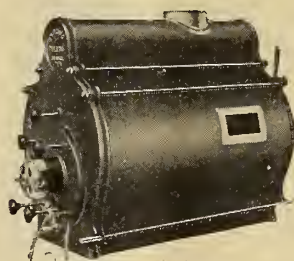
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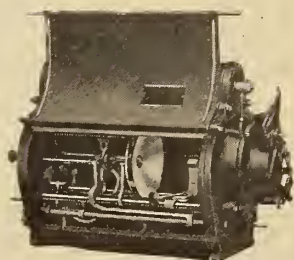
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Care of the Intermittent

By WESLEY TROUT

AS a result of the excessive pull and undue strain upon the intermittent sprockets, this part has a tendency to cause a jump on the projection screen, even though the cam and star are perfectly locked without any discernible play between them.

Invariably, this trouble will be found to be the result of the sprocket itself being loose upon its shaft, although the intermittent sprocket pins which hold it on the shaft are apparently tight. This trouble usually can be traced to the fact that the pull exerted upon the intermittent has worn away the edges of the taper pin sufficiently to create a slight play between the sprocket and the pins which fasten it on the shaft.

It is best to make an examination with an enlarging glass—a condenser will answer the purpose—and it will probably be shown that the pin holes in the intermittent sprocket shaft have become egg-shaped, instead of perfectly round, as they should be.

If such is the case, the next step is to drive out the pins very carefully, with the intermittent sprocket rested upon a "V" block, and with a properly sized taper reamer, ream out very carefully the holes in the sprocket. The holes should be reamed only enough to bring them back to their rounded proportion. Then redrive the pins, which will then set into their holes deeper than formerly, due to the enlargement of the holes; but it will be noted that they set much more firmly and securely, thus eliminating all end-play.

The reamers for the various projectors may be secured from the manufacturers. Keep a good grade of oil in the intermittent case, clean out the case frequently, and refill with clean oil. The intermittent movement is the heart of the projector and should receive the utmost care.

SUBSCRIPTION PRICE

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A YEAR

Why Flickering?

By A. S. DWORSKY

IN recent issues of some film papers there appeared several articles on the subject of flickering and poor lighting which caused bad effects on the eyes. Eyesight conservation is a subject of primary importance to everyone in the film industry, because it is the one remaining outstanding defect of motion pictures, considered from the standpoint of patrons of motion pictures the world over.

After many years in show business, I would like to advance a few suggestions tended to alleviate, if not correct entirely, the above-mentioned condition. These recommendations are the result of experiments conducted by me over a period of many years.

Flickering and cloudy effects on the screen are caused by oil which is unavoidably splashed on the film in the projector. In lubricating oil there is a certain amount of kerosene which soaks through the emulsion on the film, reaches the celluloid and then spreads, causing the disagreeable effect of flickering and a cloudy picture.

It is easy to see the reason for this when one stops to realize that the frame on the film is but 1" x $\frac{3}{4}$ ", while the screen is 12' x 16'. Unavoidable blotches of oil are magnified in the same proportion as are the images on the film. The only way to prevent these blotches is to remove oil and dirt from the film by a liquid bath.

Another defect is "rain marks" on the screen, which is caused by oil and dirt combined gathering in the scratches on the film. How and why does a film become scratched? The main reason is that the floors of inspection rooms and projection rooms are usually of cement and are therefore seldom free from grit. Film picks up this grit in various ways—either through improper rewind equipment (no control on the rewind), through carelessness, or by accident.

An inspector, or a projectionist, while looking for a particular scene or title, will unavoidably spill the film over the floor. Then when the film is run through the projector and grit that may be on it will catch on top of the aperture plate—where there is room for less than two thicknesses of film—where it may cause a scratch of from fifty to a hundred

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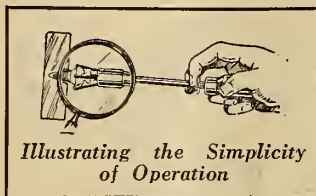
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feet long, or even the entire length of the film, before it falls through with the film. I might add here that the time when a film is most easily scratched is when it is new and the emulsion is soft. After the film is run several times the emulsion is hardened by the heat of the projector. The emulsion may be hardened by a buffing system in a laboratory.

We are all trying to find means of lengthening the life of film, but I believe that the only way to do this (excepting, of course, the observance of the ordinary rules of careful handling) is to keep the film free from oil and dirt.

No oil preparation of any kind should be used for softening the celluloid, for it will also soften the emulsion, making it more susceptible to scratches from grit and dirt that will stick to the oil.

It is really surprising how many companies in the film industry who spend millions of dollars in making pictures and millions more in building beautiful theatres, disregard the importance of the condition of the picture on the screen. As has been said many times before, both in these columns and elsewhere, all the luxurious appointments and conveniences found in present-day theatres are unable to nullify the criticism resulting from a flickering picture which imposes severe strain on the eyes.

Years ago, the fault for flickering pictures might easily have been traced to a poor quality projector or, possibly, incompetent projectionists. At that time, thousands of people remained away from the picture shows because eyestrain was inevitable. Since that time, however, projectors have been perfected, projectionists are experienced and efficient, and trouble from this source has been eliminated. Far too much time, effort and money goes into the making of a picture to have such a small but important item overlooked.

In the large, first-run houses in the cities one usually will find other attractions in addition to the picture program, so that if the film is not wholly satisfying, the other features somehow round out an entertaining program. But the great majority of people attend the outlying theatres or small-town theatres that have no attraction than the motion picture. It is to the patrons of this latter group of theatres, who have a solid two hours of pictures to look at, that are deserving of every possible effort being made to eliminate these bad effects on the screen.

What Projectionists Are Doing

Local 587—Marshall, Texas

This is our first contribution to the columns of the M. P. PROJECTIONIST. This local has subscribed 100 per cent to this paper, and we all greatly enjoy reading this (our) department.

Although we are unable at this time to startle the craft with some sensational "wrinkle" by this or that Brother, we hope to be in the lime-light in the very near future. An even dozen members is our roster, and President Tom Haden presides over the little circle at "full-attendance" meetings, with excuses for being absent being entirely out of order. Business Agent Honeycutt, although extremely modest and refined, has a persuasive way about him that invariably secures results.

Brother E. L. Kelly, Business Agent for the Longview branch of this Local, keeps things O.K. in his territory. G. H. Mercer is his protege and is a thoroughbred at that. L. F. Lloyd, stage carpenter at the Grand Theatre, would like to know if road attractions have heard of the ballad "Stay Out of the South"—we have so few.

Lastly, of course, myself—secretary-treasurer—that "snappy cinch."

Congratulations on your wonderful publication are in order. We pledge our support to the limit.

K. L. PARKER.

Local 499 — Poughkeepsie, N. Y.

The countrywide movement for better projection is not being overlooked here in Poughkeepsie.

A Projection Society, consisting of every Union projectionist in town, has been organized, and meetings are held every two weeks. It is a pleasure to report a 100 per cent attendance at these meetings and much enthusiasm.

Results are already beginning to show themselves in that we have a License Bill which is favorably regarded by the city Common Council and which will add materially to the prestige of our members.

We have also inaugurated a campaign to inform the general public of the importance of our craft in the theatre world. In this connection we



Above is shown the committee in charge of the arrangements for the Sixth Annual Ball of Local 245 at Lynn, Mass., which was held on the evening of April 13th.

The proceeds of this affair go to the Sick and Death Benefit Fund of the Local. This year's party was very successful, the party attracting a capacity throng.

In the picture above, reading left to right in the front row, are:—Jack Knoskey, Advertising Chairman; General Chairman Leo F. Barber, who has held office of President and Business Representative of Local 245 for the last 18 years and who is also Secretary of the Lynn Central Labor Union; and Entertainment Chairman Irving Dodge, who broke into show business by singing illustrated songs,

such as "When You and I Were Young, Maggie."

In the back row, reading left to right, are:—Music Chairman Charles Sowden, who has been Vice-President of Local 245 for the past ten years; James Calls, Reception Chairman; and Jack Dickinson, who saw to it that no one went without refreshments.

The last named received the first license issued by the State of Massachusetts, in 1903, and was a projectionist for 8 years prior to that time. More than 40 years ago Jack toured this country and Europe as a "Human Pin Cushion and Fire Eater."

Many screen and stage celebrities were present at the affair, which was voted the best Ball ever given by Local 245.

have prepared a series of articles bearing on our craft which will be published in a local paper. These articles were written by the undersigned and cover the following subjects: "Motion Picture Projectionists," "Eyestrain in Theatres," and "The Illusion of Motion Pictures." Copies of these articles are available to any organization desiring them.

The officers of the Society are: President, Ray Wood; Secretary, Kenneth Tyrell; Treasurer, Edward Beatty; and Vice-President,

D. EIGHME.

Local 143—St. Louis, Mo.

The following news was much too late for the March issue, but mention of it might be made in that for April.

On March 8th, Local 143 celebrated its 20th Anniversary. The affair was a tremendous success from every viewpoint. International President Canavan headed a large delegation of labor leaders who attended the affair. In addition, there were present several city officials.

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Signal Systems Between Stage And Projection Room

By IRVING GREENE

Member of Local 306, New York
City

ON many occasions the stage crew registers a complaint about not receiving a WARNING or GO signal from the projectionist for the picture sheet close-in. It matters little who is at fault in such a circumstance; the important point is that such an occurrence places the projectionist in an embarrassing position through his inability to prove himself blameless, and it invariably breaks up the continuity of a smooth-running show.

The signal system which is described here and is shown in the accompanying diagrams will, I think, work out very satisfactorily. At least, it will serve its purpose if it succeeds only in directing attention to a condition which is now prevalent in the craft and to which a corrective method should be applied.

The material necessary to operate this system is listed below:
2 single-pole, double-throw switches,

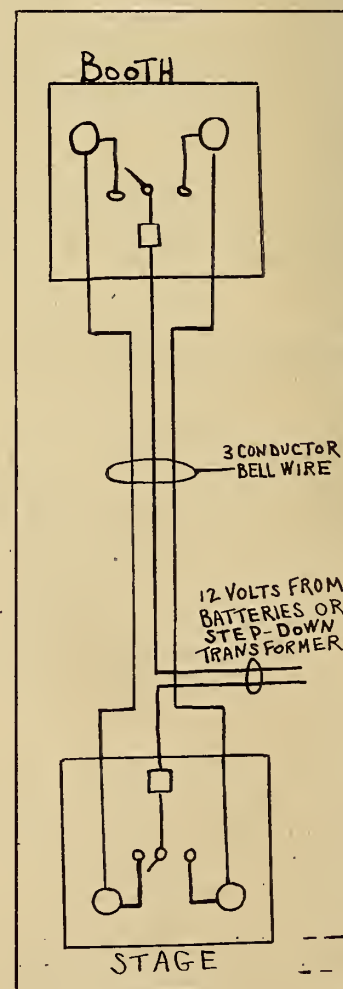


FIGURE 1.

4 porcelain sockets, 4 six-volt lamps, 2 buzzers, 2 wooden mounting boards about 6 x 8 inches, required amount of No. 3 conductor bell wire cable.

Figure 1 shows the wiring diagram for this system.

In Figure 2 is shown the correct way to mount the buzzer, lamp sockets and switch. The left part of

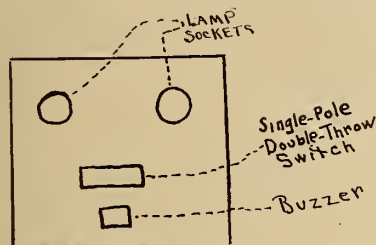


FIGURE 2.

the board is usually used as the WARNING side; the right part as the GO side.

The single-pole, double-throw switch is set by the stage crew on the WARNING side, and by the projectionist on the GO side. When the projectionist is ready to give the usual five-minute warning, he throws his switch over to the WARNING side. This completes the circuit which lights the lamps on the WARNING side and puts the buzzer in action both on the stage and in the projection room. The stage crew break the circuit by throwing their switch over to the GO side.

When the projectionist is ready for the picture sheet close-in, he throws his switch over to GO. This completes the circuit in the same way. The stage crew then throw their switch over to WARNING, which again breaks the circuit.

The switches remain in these positions until the next picture sheet close-in.

When assembling this system due care should be taken to maintain the conductor tracer on the right side.

A New Changeover Device

Wesley Trout, well-known projectionist and technical writer, has designed a new arc signal and changeover device which he will place on the market in the very near future.

He has spent several years in study and work on this device and believes that it will be a boon to projectionists in effecting perfect changeovers. The new device is designed to eliminate the common changeover troubles.

A detailed description of this device will be given in these columns in an early issue.

Over one-half of the Screens sold to Cleveland Theatres in the past five years were Diamond Bead Screens, manufactured by the Diamond Screen Products Co., Cleveland, Ohio, oldest manufacturers of Bead Screens in the United States.

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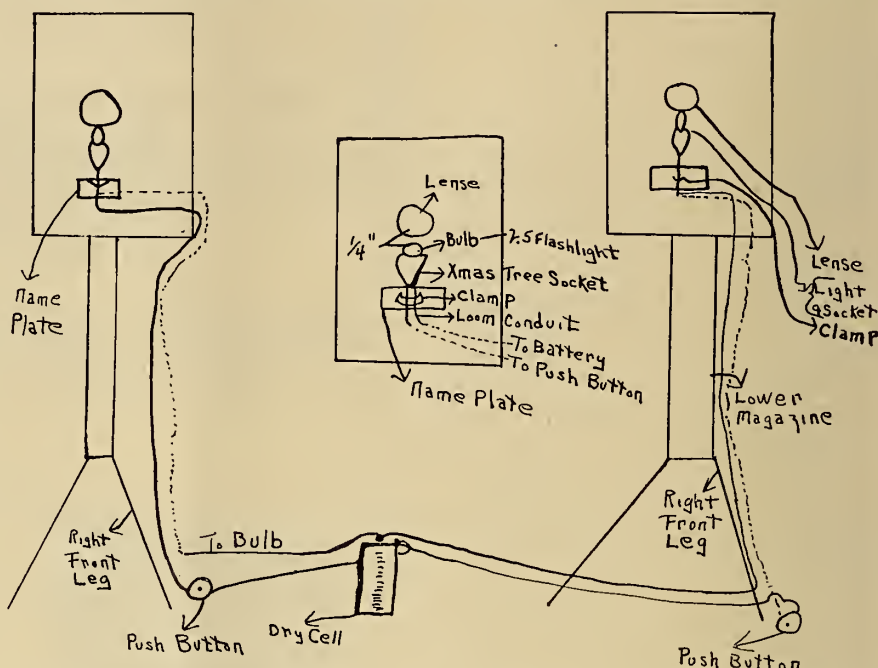
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NEW YORK

Framing a Pilot Light

By H. C. WHITCOMB



One dry cell battery will serve both projectors, if not desirable to use two. One dry cell has served me for four months and it still gives good results.

Good results may be obtained by using an ordinary flashlight bulb of about 2.5 volts in a Christmas tree socket, which is the exact size, attached to the inside of the front plate of the head in such a position that the top of the bulb is about $\frac{1}{4}$ inch below the focusing lense. This is held securely by a clamp of tin over the loom conduit which is used for

insulation on the wire passing from the inside of the head to outside for the connections.

A doorbell push-button is fastened securely to the floor within easy reach of the right foot, so that the button may be pushed to frame pictures at the aperture.

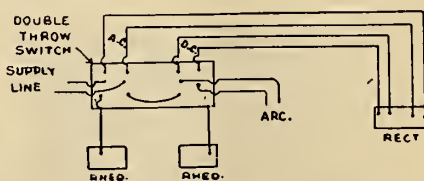
It is probably needless to state that the intermittent sprocket must be in a locked position or the shutter blade in an open position.

I found this outfit very easy on the eyes, especially on a dark print. This diagram is for a 6B Powers projector.

A Few Handy Wiring Diagrams

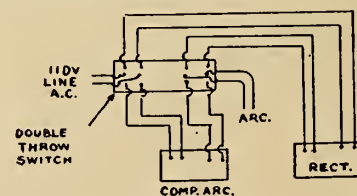
By WESLEY TROUT

The following diagram shows how to wire two rheostats and Rectifier on a four (4) pole switch:



The above diagram will show the Projectionist the correct way to wire rheostats in multiple. If you have two 30-ampere rheostats, by connecting them in multiple you will get approximately 50 to 60 amperes; while if these same resistance devices are connected in series you would only get approximately 15 to 20 amperes.

This diagram shows the Projectionist how to wire a Rectifier on an A. C. Compensarc on an eight (8) pole switch.



Subscription Price

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A Shorthand Cue Code

(Continued from page 17)

to memorize it. The answer to that is, of course, that the boys here do not find it difficult to memorize, and, what is more, they are able to take down the cues as fast as the artist can give them.

All music is written in symbols, and our friends, the musicians are considered artists. What is shorthand but symbols?

This code is contributed as a suggestion on the uniform cue sheet problem. If it does not win approval, very well. But let's not condemn it before we hear some arguments on it.

1

© # P10 On

1. A.R. 111 ⊕ X ⊙ ⊕ P10

2. P.L. 121 ⊕ ⊕ ⊙ < ⊙

3. B.F. — S. > ⊕

⊕ ⊙ ⊙ ⊙

2

1. W.S.R. 111 ⊕ X #

2. 1* # 2 A.S. 3 & 4 #

5 W.S. — X ⊙

3. W.S.R. 111 ⊕ S

4. #

5. ⊕° G.S.C. 141 ⊕ X ⊙ P.S.

C 141 ⊕ ⊕ ⊙ ⊙ ⊕

6. A.F. Band + #

7. A.F. Band

8. # V C W R B.S.

TRUM TRUM SWX—

W.F. > P10 — #

A U W S R ⊕ ⊙

X ALT ⊙ R & L.

Sample Cue Sheet in Code

Thus far suggestions on uniform cue sheets have been received from the following, in addition to Mr. Johnson: A. W. Fried, Brooklyn, N. Y.; Paul Ament and E. J. Sessions, New York City, and F. Day, St. Paul, Minn.

Vitaphone—in May Number

In order to make more complete the article on Vitaphone scheduled for this issue it has been held over for the May issue. A complete resume therefore will be published in May and the series on Movietone will be started with June number.

—The Editors

Motion Pictures by Wire

Motion pictures transmitted over telephone wires became a reality on April 4th when ten feet of film showing a closeup of Vilma Banky, screen star, were photographed in Chicago at 11:30 A. M. (New York time), put on the wires of the A. T. & T. after development and transmitted 1,000 miles away to New York, where they were received at the rate of 1½ feet per minute and then rushed to Long Island City, where they were developed in time to be shown on the screen at the Embassy Theatre, in New York, at 7 o'clock the same evening. Transmission of pictures over telephone wires has been in practice for more than a year and a half, but this marks the first instance where a motion picture was sent over a telephone wire. This process, which is not to be confused with *television* (which is the transmission of pictures by radio), is known as telephotography.

The method of transmission for telephotography is as follows: The negative motion picture film taken in Chicago was there developed and dried and cut into strips six inches long. It was then placed three strips at a time between glass plates. These plates were rephotographed and a solid 5 x 7 inch positive film, in most ways identical with "still" telephotographic film, was placed on the sending machine in Chicago.

Telephotograph transmission is accomplished by producing an electrical current proportional in intensity at all times to the shades of light in a picture, the film of which is moved transversely across a constant beam of light. This current in the present case is amplified and then transmitted from Chicago to New York over telephone wires and here converted back into a beam of light of proportional intensity which acts on an ordinary sensitized film. The motors operating the respective sending and receiving equipments, between the two widely separated cities, are driven by tuning forks which, combined with other apparatus, have the difficult assignment of keeping the motion of the films perfectly synchronized throughout the transmission.

Both sending and receiving machines have somewhat the same appearance as the phonograph of the old cylindrical style. From an aperture on one side comes a bright penetrating beam of light and this moves across the cylinder on which is curved the film. Each transmission takes seven minutes and all strips are numbered so that the continuity is not broken.

The results for transmission of motion picture film are said by telephotograph representatives to be the same whether the pictures are transmitted from Chicago or from Los Angeles or San Francisco.

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This entire Index is corrected monthly. So far as possible it embraces every product, every manufacturer and every dealer of interest to projectionists. Manufacturers and Dealers are requested to look over this index carefully and report to us at once if their names are missing, wrongly spelled or wrong address listed. Insertions and corrections will be made at once.

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Fulco Schaffer Sales Co., 24 E. 8th St., Chicago, Ill.
E. E. Fulton Ct., 1018 So. Wabash Ave., Chicago, Ill.
Holke Theatre Supply Co., 845 So. State St., Chicago, Ill.
Joseph Hopp, 57 E. Jackson Blvd., Rm. 604, Chicago, Ill.
Illinois Theatre Equip. Co., 12-14 E. 9th St., Chicago, Ill.
Kiefer Elec. Supply Co., Peoria, Ill.
Midwest Ticket & Supply Co., 845 So. Wabash Ave., Chicago, Ill.
Monarch Theatre Supply Co., 724 So. Wabash Ave., Chicago, Ill.
Movie Supply Co., 844 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 825 So. Wabash Ave., Chicago, Ill.
National Theatre Supply Co., 624 So. Michigan Ave., Chicago, Ill.
Royal Theatre & Supply Co., 180 East Ave., Kankakee, Ill.
Joseph Spratler, 12-14 E. 9th St., Chicago, Ill.
Western Motion Pictures Co., 102 W. Main St., Danville, Ill.
Co-operative Amusement & Supply Co., Gaiety Theatre Bldg., Springfield, Ill.

Dealers

INDIANA

Exhibitors Supply Co., 128 W. Ohio St., Indianapolis, Ind.
Fort Wayne Engineering & Supply Co., 6th and No. Harrison Sts., Fort Wayne, Ind.
Fulco Sales Co., 111 So. Capitol Ave., Indianapolis, Ind.
E. E. Fulton Co., 111 So. Capitol Ave., Indianapolis, Ind.
H. Liever Co., 24 W. Washington St., Indianapolis, Ind.
Muncie Film Supply Co., 202½ E. Main St., Muncie, Ind.
National Theatre Supply Co., 128 W. Ohio St., Indianapolis, Ind.

IOWA

Blackmore, W. F., 315 Brady St., Davenport, Iowa.
Dubuque Sales Co., 2734 Jackson St., Dubuque, Iowa.
Eastman Kodak Stores, Inc., 608 Fierce St., Sioux City, Iowa.
Exhibitors' Supply Co., Des Moines, Iowa.
National Theatre Supply Co., 1004 Grand Ave., Des Moines, Iowa.
National Theatre Supply Co., 10th and High Sts., Des Moines, Iowa.
Zimmerman Brothers, Sioux City, Iowa.

KANSAS

Southwest Theatre Equipment Co., Wichita, Kans.

KENTUCKY

American M. P. Co., Alamo Theatre Bldg., Louisville, Ky.
Blake Amusement Co., 435 So. 3rd St., Louisville, Ky.
Scheckler, Arthur V., Tyler Bldg., Louisville, Ky.
Louisville Film & Supply Co., Rex Theatre Bldg., 555 So. 1st St., Louisville, Ky.

LOUISIANA

Consolidated Film & Supply Co., 914 Craver St., New Orleans, La.
Crescent City Film Exchange, 621 Poydras St., New Orleans, La.
Electrical Supply Co., 324 Camp St., New Orleans, La.
Harcot M. P. Industries, 610 Baronne St., New Orleans, La.
National Theatre Supply Co., 610 Saratoga St., New Orleans, La.
Southern Theatre Equipment Co., New Orleans, La.
Southern Theatre Service, 1219 Alvar St., New Orleans, La.
Vivirito, George, 318 Batonna St., New Orleans, La.

MAINE

Pine Tree State Amusement Co., 85 Market St., Portland, Maine.

MARYLAND

Dusman, J. F., 213 No. Calvert St., Baltimore, Md.
Haelele, N. C., 228 Gay St., Baltimore, Md.
Lewy Studios, 853 No. Eutaw St., Baltimore, Md.
National Theatre Supply Co., 228 Gay St., Baltimore, Md.
Townsend, H. S., 1625 E. 29th St., Baltimore, Md.
Wyatt, E. J., 1605 No. Milton Ave., Baltimore, Md.

MASSACHUSETTS

Eastern Theatre Equip. Corp., 65 Broadway, Boston, Mass.
Exhibitors' Supply Co., 67 Church St., Boston, Mass.
Gately, J. F., 33 Lyman St., Springfield, Mass.
Handy, A. D., Boston, Mass.
Independent Theatre Supply Co., 49 Church St., Boston, Mass.
Marson, R. D., 106 Broadway, Boston, Mass.
National Theatre Supply Co., 69 Church St., Boston, Mass.

Dealers

Rotman, Morris, 26 Browning Ave., Dorchester, Mass.
 United Theatre Equip. Co., 26 Piedmont St., Boston, Mass.
 Wells & Douglas, 1108 Boylston St., Boston, Mass.
 Wetmore, B. C., 2 Park Sq., Boston, Mass.
 Wheaton, L. B., Worcester, Mass.
 Worcester Film Corp., 340 Mason St., Worcester, Mass.

MICHIGAN

Amusement Supply Co., Film Bldg., Detroit, Mich.
 Cinema Ser. Co., 141 Elizabeth St., E., Detroit, Mich.
 Exhibitors' Supply Co., 14 Elizabeth St., Detroit, Mich.
 Feldstein, A. N., 1670 Pasadena Ave., Detroit, Mich.
 Theo. Kundtz & Co., 402 Lincoln Bldg., Detroit, Mich.
 McArthur Equip. Co., 1963 Grand River Ave., Detroit, Mich.
 National Theatre Supply Co., 2105 John R St., Detroit, Mich.
 Service Theatre Supply Co., 137 Elizabeth St., Detroit, Mich.

MINNESOTA

Cunningham, H. B., 964 University Ave., St. Paul, Minn.
 General Distributing Co., 110 Lake Ave., So., Duluth, Minn.
 Huntleys, The, Winona, Minn.
 Lochran Film & Slide Service, 706 Film Exchange Bldg., Minneapolis, Minn.
 National Equipment Co., 409 W. Michigan Ave., Duluth, Minn.
 National Theatre Supply Co., 221 Loeb Arcade, Minneapolis, Minn.
 Rialto Theatre Supply Co., 56 Glenwood Ave., Minneapolis, Minn.
 Twin City Caldium & Supply Co., 706 First Ave., N., Minneapolis, Minn.
 The Western Equip. Exchange, 35 Western Ave., Minneapolis, Minn.

MISSISSIPPI

Southern Theatre Service, P. O. Box 455, Grenada, Miss.

MISSOURI

Cole Theatre Supply Co., 109 W. 18th St., Kansas City, Mo.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Exhibitors' Supply Co., 3316 Lindell St., St. Louis, Mo.
 Fulco-Schaffer Co., 3301 Olive St., St. Louis, Mo.
 Fulton, E. E., & Co., 3403 Olive St., St. Louis, Mo.
 National Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 National Theatre Supply Co., 3315 Olive St., St. Louis, Mo.
 Opera Supply Co., 601 Shubert Bldg., St. Louis, Mo.
 Sanderson Elec. Co., St. Louis, Mo.
 Sewitz & Engel Theatre Supplies, St. Louis, Mo.
 Star Film & Supply Co., 413 Edward St., St. Joseph, Mo.
 Stebbins, Charles M., Picture Supply Co., 1822 Wyandotte St., Kansas City, Mo.
 Yale Theatre Supply Co., 108 W. 18th St., Kansas City, Mo.
 A-A Electric Machinery Co., 1117 Cherry St., Kansas City, Mo.

MONTANA

Western Theatre Equipment Corp., Billings, Mont.

NEBRASKA

Eastman Kodak Stores, Inc., Lincoln, Neb.
 Lincoln Photo Supply Co., Omaha, Neb.
 National Theatre Supply Co., 1514 Davenport St., Omaha, Neb.
 Quality Theatre Supply Co., 1605 Davenport St., Omaha, Neb.
 Service Theatre Supply Co., 303 No. 16th St., Omaha, Neb.
 U. S. Theatre Supply Co., 1506 Davenport St., Omaha, Neb.

Dealers

NEW JERSEY

Kaufman, Frank N., 750 Broad St., Newark, N. J.
 Metropolitan Motion Picture Co., 116 Market St., Newark, N. J.

NEW MEXICO

Eastern New Mexico Theatre Supply Co., Box 548, Clovis, N. M.

NEW YORK

J. F. Adams, 459 Washington St., Buffalo, N. Y.
 Acme Exchange, 341 W. 44th St., N. Y. City.
 Amusement Supply Co., 729 Seventh Ave., N. Y. City.
 Auburn Film Co., Auburn, N. Y.
 Auburn Theatrical Supply Co., Auburn, N. Y.
 A. Z. Motion Picture Supply Co., 266 Houston St., N. Y. City.
 A. Z. Motion Picture Supply, 1413 Bedford Ave., Brooklyn, N. Y.
 Becker Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Behrend Motion Picture Supply Co., 729 Seventh Ave., N. Y. City.
 Bender, George, 28 Centre St., N. Y. City.
 Better Service Film Co., 110 Ferris Ave., Syracuse, N. Y.
 Capitol Motion Picture Supply Co., 727 Seventh Ave., N. Y. City.
 Capitol Stg. & Ltg. Co., 626 Tenth Ave., N. Y. City.
 Columbia Stg. Ltg. Co., 709 Columbia Theatre Bldg., N. Y. City.
 Crouse, Hinds Co., Wolf and 7th Sts., Syracuse, N. Y.
 Crown Motion Pic. Supplies, 729 Seventh Ave., N. Y. City.
 Empire Theatre Supply Co., 42 Orange St., Albany, N. Y.
 Empire Theatre Sup. Co., 619 Spring St., Utica, N. Y.
 Fenyessey, Carol, Rochester, N. Y.
 Gennert, G., 24 E. 13th St., N. Y. City.
 Greenbaum, 436 Corneliuss St., Brooklyn, N. Y.
 Herbert & Huesgen, 18 E. 42nd St., N. Y. City.
 Hudson Elec. Equip. Co., 141 W. 44th St., N. Y. City.
 Independent Movie Sup. Co., 42 Orange St., Albany, N. Y.
 Lyon, J. T. & D. B., Schenectady, N. Y.
 Kaplan, Sam, 729 Seventh Ave., N. Y. City.
 Mason, Chas. E., 103 W. Main St., Rochester, N. Y.
 Mestrum, H., 817 Sixth Ave., N. Y. City.
 Modern Elec. Mch. Co., 2927 Third Ave., N. Y. City.
 Motion Picture Apparatus Co., 110 W. 32nd St., N. Y. City.
 Motion Picture Service Co., 417 W. 44th St., N. Y. City.
 National Theatre Supply Co., 1560 Broadway, N. Y. City.
 National Theatre Supply Co., 416 Pearl St., Buffalo, N. Y.
 Charles I. Newton, 244 West 14th St., New York City.
 Perfection Supply Co., 98 Park Pl., N. Y. City.
 S & M Sales Co., 123 Lafayette St., Utica, N. Y.
 Supreme Motion Picture Repair Co., 926 Broadway, Brooklyn, N. Y.
 Syracuse Supply Co., 314 W. Fayette St., Syracuse, N. Y.
 United Proj. & Film Corp., 51 Chapel St., Albany, N. Y.
 United Proj. & Film Corp., 228 Franklin St., Buffalo, N. Y.
 Univ. Elec. Stage Ltg. Co., 321 W. 50th St., N. Y. City.

NORTH DAKOTA

McCarthy Supply Co., 619 N. P. Ave., Fargo, N. D.

NORTH CAROLINA

A. & B. Moving Picture Supply Co., Raleigh, N. C.
 Carolina Theatre Supply Co., United Film Bldg., Charlotte, N. C.
 Ettabran Film Co., Charlotte, N. C.
 Exhibitors' Supply Co., Charlotte, N. C.
 National Theatre Supply Co., 222 W. 4th St., Charlotte, N. C.

Dealers

OHIO

American Theatre Equipment Co., 165½ No. High St., Columbus, Ohio.
 American Theatre Supply Co., 310 St. Clair St., Toledo, Ohio.
 Artfilm Co., Cleveland, Ohio.
 Bodiker, D. A., 128 No. Garfield St., Dayton, Ohio.
 Central F. F. Co., 60 Public Sq., Lima, Ohio.
 Cincinnati Theatre Supply Co., Broadway Film Bldg., Cincinnati, Ohio.
 Cincinnati M. P. Co., 1434 Vine St., Cleveland, Ohio.
 Dayton Theatre Sup. Co., 225 Jefferson St., Dayton, Ohio.
 Doner, Frank M., 2409 Maple Wood Ave., Toledo, Ohio.
 Dwyer Bros. & Co., 520 Broadway, Cincinnati, Ohio.
 Exhibitors' Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Folwer & Salter, Cleveland, Ohio.
 Gross & Johnson, 2100 Payne Ave., Cleveland, Ohio.
 Limbocker, George, Springfield, Ohio.
 Motion Picture Equip. Co., 17 Ervin Block, West Canton, Ohio.
 Moving Picture Equip. Co., 208 Market Ave., So., Canton, Ohio.
 Moving Picture Supply Co., 439 Falls Ave., Youngstown, Ohio.
 National Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 National Theatre Supply Co., 520 Broadway, Cincinnati, Ohio.
 O'Connor & Co., A., 9702 Euclid Ave., Cleveland, Ohio.
 Oliver Moving Pic. Sup. Co., Film Exchange Bldg., Cleveland, Ohio.
 Post Glover Elec. Co., Cincinnati, Ohio.
 Price, L. M., Co., 108 W. 4th St., Cincinnati, Ohio.
 Romell Motion Pictures, Inc., 1411 Walnut St., Cincinnati, Ohio.
 Runey, Clarence E., 1434 Vine St., Cincinnati, Ohio.
 Standard Film & Service Co., Cleveland, Ohio.
 Theatre Supply Co., 2112 Payne Ave., Cleveland, Ohio.
 Tri-State Supply Co., 2112 Payne Ave., Cleveland, Ohio.

OKLAHOMA

Anderson Theatre Supply Co., 116 So. Hudson St., Oklahoma City, Okla.
 National Theatre Supply Co., 308 W. California St., Oklahoma City, Okla.
 United Theatre Equip. Corp., 116 So. Hudson St., Oklahoma City, Okla.
 Yale Theatre Supply Corp., 10 So. Hudson St., Oklahoma City, Okla.
 Southern Theatre Equip. Co., 328 California Ave., Oklahoma City, Okla.
 Shelton, J. M., Oklahoma City, Okla.

OREGON

Bentley, E. E., Hillsboro, Ore.
 Conant, C. F., Portland, Ore.
 National Theatre Supply Co., 60 Glisan St., Portland, Ore.
 National Theatre Supply Co., 393 Oak St., Portland, Ore.
 Portland Moving Picture Mch. Co., Rivoli Theatre Bldg., Portland, Ore.
 Service Film & Supply Co., 393 Oak St., Portland, Ore.

PENNSYLVANIA

Alexander, George H., Diamond St., Pittsburgh, Pa.
 Atlas Supply Co., 108 Ring St., Philadelphia, Pa.
 Bates, George, 662 Shade St., Pittsburgh, Pa.
 Bennell, Chas. H., 261 No. Clarion St., Philadelphia, Pa.
 Bennett, C. H., 224 No. 13th St., Philadelphia, Pa.
 Catsiff, J., 1214 Market St., Philadelphia, Pa.
 Chamberlain Amuse. Enter., Inc., Shamokin, Pa.
 Columbia Film Service, 1010 Forbes St., Pittsburgh, Pa.
 Consolidated Film Co., 1237 Vine St., Philadelphia, Pa.
 Electric Theatre Supply Co., 1309 Vine St., Philadelphia, Pa.
 Gompertz, Abram B., Exhibitors' Clearing House & Supply Co., 1243 Vine St., Philadelphia, Pa.
 Hannson, J. G., 10th and Spring Sts., Reading, Pa.

Dealers

Hollis, Smith & Morton, 1024 Forbes St., Pittsburgh, Pa.
 Janicks, Michael, 1105 Gibson St., Pittsburgh, Pa.
 Morton, Ed. B., 1006 Forbes St., Pittsburgh, Pa.
 Motion Picture Machine Co., 609 Neville St., Pittsburgh, Pa.
 National Theatre Supply, 1024 Forbes St., Pittsburgh, Pa.
 National Theatre Supply Co., 1311 Vine St., Philadelphia, Pa.
 Phila. Theatre Equip. Co., 252 No. 13th St., Philadelphia, Pa.
 Pittsburgh M. P. Supply Co., 1006 Forbes St., Pittsburgh, Pa.
 Rizzo, Clem, 262 No. 13th St., Philadelphia, Pa.
 S & S Film & Supply Co., A. Steinberg, 1026 Forbes St., Pittsburgh, Pa.
 Smith, Harry J., 436 Diamond St., Pittsburgh, Pa.
 Superior Motion Picture Supply Co., 1026 Forbes St., Pittsburgh, Pa.
 Swaab & Son, Lewis M., 1327 Vine St., Philadelphia, Pa.
 Williams, Browne & Earle, 918 Chestnut St., Philadelphia, Pa.
 Cadoret, William H., Theatre Supply Co., Scranton, Pa.
 Equipment Theatre Supply Co., Penn Ave., Scranton, Pa.

RHODE ISLAND

Allen Feature Film Co., Providence, R. I.
 McKenna, James, Providence State Ltg. Co., 12 Moulton St., Providence, R. I.
 Taylor, H. O. & E. S., 76 Dorrence St., Providence, R. I.

SOUTH CAROLINA

Independent Theatre Supply Co., 111 W. Coffee St., Greenville, S. C.

SOUTH DAKOTA

American Theatre Supply Co., Sioux Falls, S. D.

TENNESSEE

Consolidated Film & Supply Co., 226 Union Ave., Memphis, Tenn.
 Monarch Theatre Supply Co., 228 Union Ave., Memphis, Tenn.
 White Theatre Equipment Co., Phipps Bldg., Bristol, Tenn.

TEXAS

Atlantic Sales Co., 1816 Main St., Dallas, Tex.
 Dallas Theatre Supply Co., 1911 Commerce St., Dallas, Tex.
 National Theatre Supply Co., 306 So. Harwood St., Dallas, Tex.
 Peerless Film Svc., 322 San Antonio St., El Paso, Tex.
 Educational Equip. Co., 1913-A Commerce St., Dallas, Tex.
 Simplex Theatre Supply Co., Film Exchange Bldg., Dallas, Tex.
 Simpson, James P., Co., Inc., Dallas, Tex.
 Southern Film Svc., 811 Franklin Ave., Houston, Tex.
 Southern Theatre Equip. Co., 1815 Main St., Dallas, Tex.
 Thrash, R. D., Co., Film Row, Dallas, Tex.

UTAH

Alhambra Theatrical Co., Hudson Ave., Ogden, Utah.
 Argus Enterprises Co., Inc., 132 E. Second St., Salt Lake City, Utah.
 National Theatre Supply Co., 132 E. 2nd St., Ogden, Utah.
 Salt Lake Theatre Supply Co., 48 Exchange Pl., Salt Lake City, Utah.
 Universal Film & Supply Co., 56 Exchange Pl., Salt Lake City, Utah.
 Utah Theatre Supply Co., 125 E. 2nd South St., Salt Lake City, Utah.
 Worman Supply Co., 2429 Hudson Ave., Ogden, Utah.

VERMONT

Allen & Underhill, Chelsea, Vt.
 H. P. Boardman, Burlington, Vt.

Dealers**VIRGINIA**

Burchard, W. A., Co., 56 Commerce St., Norfolk, Va.
 Chocklett, Luther A., Co., Over Mt. Trust Bldg., Roanoke, Va.
 Southern Theatre Supply Co., 25 Old St., Petersburg, Va.

WASHINGTON, D. C.

Capitol Theatre Supply, 316 McGill Bldg., Washington, D. C.
 Carroll Electric Co., 714 12th St., N. W., Washington, D. C.
 Colman, 916 G St., N. W., Washington, D. C.
 Columbia Photo Supply Co., 1424 New York Ave., N. W., Washington, D. C.
 Fuller & D'Alhert, 815 10th St., N. W., Washington, D. C.
 Higgins, F. L., 804 11th St., N. W., Washington, D. C.
 L & S Theatre Sup. Co., 908 G St., N. W., Washington, D. C.
 Theatre Supply Co., 916 G St., N. W., Washington, D. C.
 Lust, Sidney B., 916 G St., N. W., Washington, D. C.
 National Theatre Supply Co., 719 9th St., N. W., Washington, D. C.
 Scientific & Cinema Supply Co., 804 11th St., N. W., Washington, D. C.
 Southern Moving Picture Corp., 310 McGill Bldg., Washington, D. C.
 Thompson, E. B., 722 10th St., N. W., Washington, D. C.
 Washington Theatre Supply Co., 719 9th St., N. W., Washington, D. C.

WASHINGTON

Film Supply Co., 217 Virginia St., Seattle, Wash.
 Graham, John W., Spokane, Wash.
 Lowman & Handford, Seattle, Wash.
 National Theatre Supply Co., 1927 Third Ave., Seattle, Wash.
 Shearer, B. F., Inc., 210 Virginia St., Seattle, Wash.
 Spokane Theatre Supply Co., 410 W. 1st St., Spokane, Wash.
 Theatre Supply Co., 2016 Third Ave., Seattle, Wash.

WEST VIRGINIA

Charleston Elec. Sup. Co., Charleston, W. Va.
 Charleston Theatre Supply Co., Charleston, W. Va.
 Columbia Film Svc. Co., 707 Dryden St., Charleston, W. Va.
 Educational Film Co. of West Virginia, Charleston, W. Va.
 McGray & McGray Co., 329 Main St., Fairmont, W. Va.
 Standard Theatre Supply Co., 3608 Jacob St., Wheeling, W. Va.
 West Virginia Amusement & Film Co., 113½ Capitol St., Charleston, W. Va.

WISCONSIN

National Theatre Supply Co., 715 Wells St., Milwaukee, Wis.
 Smith, Ray, Co., 145 Seventh St., Milwaukee, Wisconsin.
 Wisconsin Film Corp., 134 Grand Ave., Milwaukee, Wis.

Manufacturers**Arc Lamps**

Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
 Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
 Cinema Studios Supply Corp., 1438 Beechwood Dr., Hollywood, Cal.
 Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
 General Electric Co., Schenectady, N. Y.
 Hall & Connelly, Inc., 125 Grand St., New York City.
 Hallberg, J. H., 445 Riverside Dr., New York City.
 International Projector Corp., 90 Gold St., New York City.
 Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.

Manufacturers

Max Mayer Co., 218 W. 42nd St., New York City.
 Motion Picture Service Co., 417 W. 44th St., New York City.
 Mestrum, Henry, 817 Sixth Ave., New York City.
 Rollaway Motor Co., 122 Southard Ave., Toledo, Ohio.
 Strong Lamp Co., 2501 Lagrange St., Toledo, Ohio.
 Wohl & Co., Inc., M. J., Paynter Ave. and Hancock St., Long Island City, N. Y.

Booths, Projection

A. G. Mfg. Co., Seattle, Wash.
 Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Blaw Knox Co., Bayard and Warner Sts., Baltimore, Md.
 Edward Mfg. Co., Cincinnati, Ohio.
 Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
 Goldberg Bros., 1646 Lawrence St., Denver, Colo.
 Harry Steel Co., O. K., 2333 Papin St., St. Louis, Mo.
 Johns-Manville Co., 41st St. and Madison Ave., New York City.
 Keasbey & Mattison Co., Dept. N., Ambler, Pa.
 Langslow Co., H. R., 232 Jay St., Rochester, N. Y.
 Mestrim, Henry, 810 Sixth Ave., New York City.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newman Mfg. Co., 416 Elm St., Cincinnati, Ohio.
 Riverside Mfg. Co., Newark, N. J.
 Sharlow Bros., 442 W. 42nd St., New York City.
 Steel Roofing & Stamping Works, 506 S. W. 2nd St., Des Moines, Iowa.
 Thorp Fire Proof Door Co., Minneapolis, Minn.
 Williams, Browne & Earle, Inc., 918 Chestnut St., Philadelphia, Pa.

Carbons

Arco Electric Co., 110 W. 42nd St., New York City.
 Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
 Diesman, J. D., Baltimore, Md.
 M. G. Felder, 1560 Broadway, New York City.
 Hiegel, Frank J., 440 State St., Schenectady, N. Y.
 National Carbon Co., Madison Ave., N. W., and W. 117th St., Cleveland, Ohio.
 Phellis & Co., C. W.
 Hugo Reisinger, 11 Broadway, New York City.
 Warner Prod. Co., Inc., 265 Canal St., New York City.

Cases and Cans, Reel Carrying

Ajax Film Accessories Co., 30 Church St., New York City.
 American Can Co., New York City, N. Y.
 Fulton Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 Gotham Can Co., 57 Eagle St., Brooklyn, N. Y.
 Indestructible Metal Products Co., 521 W. 45th St., New York City.
 Los Angeles Can Co., Los Angeles, Cal.
 Moeschl-Edwards Corrugating Co., Covington, Ky.
 Newmade Products Corp., 249 W. 47th St., New York City.
 Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.
 Russakov Can Co., Chicago, Ill.

Cement, Film

Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
 Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
 Eastman Kodak Co., Rochester, N. Y.
 Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
 International Projector Corp., 1130 W. Austin Ave., Chicago, Ill.
 Monarch Theatre Supply Co., 1223 So. Wabash Ave., Chicago, Ill.
 Newmade Products Corp., 248 W. 47th St., New York City.
 Rothacker Film Mfg. Co., 1339 Diversy Pkwy., Chicago, Ill.

Manufacturers

Technical Color & Chem. Works, 523 Third Ave., Brooklyn, N. Y.
Weldon Film Cement Co., 301 Loeh Arcade, Minneapolis, Minn.

Film Safes and Cabinets

American Film Safe Corp., Baltimore, Md.
Atlas Metal Works, 2601 Alamo St., Dallas, Texas.
Columbia Metal Box Co., 226 E. 144th St., New York City.
Duplex Motion Picture Industries, 74 Sherman Ave., Long Island City, N. Y.
Film Safe Co., 92 William St., New York City.
Agent for American Film Safe Corp., Baltimore Md.
Fulton, E. E., 3208 Carroll Ave., Chicago, Ill.
Neumade Products Corp., 249 W. 47th St., New York City.
Sharlow Bros. Co., 442 W. 42nd St., New York City.

Film Splicing Machines

Bell & Howell Co., 1827 Larchmont Ave., Chicago, Ill.
Duplex M. P. Industries, 74 Sherman Ave., Long Island City, N. Y.
Duplex Machine Co., 317 Seventy-Fifth Ave., Brooklyn, N. Y.
Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
Gennert, Inc., G., 24 E. 13th St., New York City.
Griswold Machine Works, Port Jefferson, N. Y.
Lochren Film & Slide Co., Wm. A., 706 Film Exchange Bldg., Minneapolis, Minn.
Neumade Products Corp., 249 W. 47th St., New York City.
Pausin Engineering Co., 727 Frelinghuysen Ave., Newark, N. J.

Lamps

Edison Lamp Works of the General Electric Co., Harrison, N. J.
National Lamp Works, Nela Park, Cleveland, Ohio.
Westinghouse Lamp Co., 150 Broadway, New York City.

Lamps, Reflector

Besseler Co., Charles, 131 E. 23rd St., New York City.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
Fulton & Co., E. E., 3208 Carroll Ave., Chicago, Ill.
Goerz American Optical Co., 317 E. 34th St., New York City.
Kliegl Bros. Universal Stage Light Co., Inc., 321 W. 50th St., New York City.
McAuley Mfg. Co., J. E., 552 W. Adams St., Chicago, Ill.
Morelite Co., Inc., 600 W. 57th St., New York City.
Preddy, Walter G., 187 Golden Gate Ave., San Francisco, Cal.
Warren Products, 265 Canal St., New York City.

Lights, Spot

Bennett, Chas. H., 224 N. 13th St., Philadelphia, Pa.
Best Devices, 22 Film Bldg., Cleveland, Ohio.
Brenkert Light Proj. Co., 7348 St. Aubin Ave., Detroit, Mich.
Capitol Stage Lighting Co., 626 Tenth Ave., New York City.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
De Bus, Al., 1072 N. Wilton Pl., Hollywood, Cal.
Diesman, J. F. D., Baltimore, Md.
Display Stage Lighting Co., 354 W. 44th St., New York City.
Ensawille, R. C., 304 W. 52nd St., New York City.
Erikson, Electric Co., L., 6 Portland St., Boston, Mass.
Franklin Electric Products Co., 750 Prospect Ave., S. E., Cleveland, Ohio.
General Electric Co., Schenectady, N. Y.
Hall & Connelly, 129 Grand St., New York City.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Klonchek, Chas. E., 528 Flanders St., Portland, Ore.

Manufacturers

Mestrum, Henry, 817 Sixth Ave., New York City.
Motion Picture Service Co., 417 W. 44th St., New York City.
Newton, Chas. I., 244 W. 14th St., New York City.
Perkins Electric Co., 21 Wilton Sq., Toronto, Ont.
Precision Machine Co., 23½ So. 8th St., Minneapolis, Minn.
Sun Ray Lighting Co., 119 Lafayette St., New York City.
Universal Stage Lighting Co., 321 W. 50th St., New York City.
Wheeler Green Electric Co., 29-39th St., Rochester, N. Y.
Wohl & Co., M. J., Hancock St., Long Island City, N. Y.

Projectors

American Motion Picture Projector Co., 1134 W. Austin Ave., Chicago, Ill.
Baird Motion Picture Machine Co., 31 Runyon St., Newark, N. J.
Bell & Howell Co., 1801 Larchmont St., Chicago, Ill.
Enterprise Optical Mfg. Co., 564 W. Randolph St., Chicago, Ill.
International Projector Corp., 90 Gold St., New York City.
Kaplan, Sam, 729 Seventh Ave., N. Y. City.

Reels, Film

Acme Stamping & Mfg. Co., Pittsburgh, Pa.
Duplex M. P. Industries, Inc., Long Island City, N. Y.
Geometric Stamping Co., 221 E. 131st St., Cleveland, Ohio.
Globe Machine & Stamping Co., 1250 W. 76th St., Cleveland, Ohio.
Goldberg Bros., 1646 Lawrence St., Denver, Colo.
Heigel, Frank J., 440 State St., Schenectady, N. Y.
Mossberg Co., Frank, Attleboro, Mass.
Neumade Products Corp., 249 W. 47th St., New York City.
Sharlow Bros. Co., 442 W. 42nd St., New York City.
Taylor-Shantz Co., 478 St. Paul St., Rochester, N. Y.
Winship & Sons, W. W., Utica, N. Y.

Reflectors, Light

American Reflector & Lighting Co., 100 So. Jefferson St., Chicago, Ill.
Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
Chicago Stage Lighting Co., 112 N. La Salle St., Chicago, Ill.
Curtis Lighting Co., 1119 W. Jackson Blvd., Chicago, Ill.
Erickson Electric Co., 6 Portland St., Boston, Mass.
Frink, I. P., Inc., 239 Tenth Ave., New York City.
General Outdoor Advertising Co., 550 W. 27th St., New York City.
Heinrich Reflector Co., 645 W. 43rd St., New York City.
Huh Electric Co., 2219 W. Grand Ave., Chicago, Ill.
Kliegl Bros. Universal Stage Lighting Co., 321 W. 50th St., New York City.
Major Equipment Co., Inc., 4603 Fullerton Ave., Chicago, Ill.

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Automatic Film Rewinder, Harrisburg, Pa.
Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill.
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Duplex Machine Co., 316-75th St., Brooklyn, N. Y.
Electrical Prods. Corp., 1122 W. 16th St., Los Angeles, Cal.
Lang Mfg. Works, Olean, N. Y.
Neumade Products Corp., 249 W. 47th St., New York City.
Stern Metal Works, 1006 Vine St., Philadelphia, Pa.

Rheostats

Brenkert Light Projection Co., 7348 St. Aubin Ave., Detroit, Mich.
Chicago Stage Lighting Co., 112 No. La Salle St., Chicago, Ill.
Cutler Hammer Mfg. Co., Milwaukee, Wis.

Manufacturers

Duplex M. P. Industries, Inc., Long Island City, N. Y.
General Electric Co., Schenectady, N. Y.
Hall & Connelly Co., 129 Grand St., New York City.
Hertner Electric Co., 1900 W. 112th St., Cleveland, Ohio.
Hoffman & Soons, 522 First Ave., New York City.
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American Silversheet Co., 915 Washington St., St. Louis, Mo.
Da-Lite Screen Co., 922 W. Monroe St., Chicago, Ill.
Diamond Screen Products Co., 1222 Ontario St., Cleveland, Ohio.
Gardiner Co., L. J., 1021 W. Goodale Blvd., Columbus, Ohio.
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National Screen Co., 2100 Payne Ave., Cleveland, Ohio.
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Rembusch Screen Co., Shelbyville, Ind.
Royal M. P. Screen Co., 910 Manhattan Ave., Brooklyn, N. Y.
Spencer Lens Co., 442 Niagara St., Buffalo, N. Y.
Story Scenic Co., 21 Tufts St., Somerville Sta., Boston, Mass.
Trans-Lux Daylight Picture Screen, Inc., 247 Park Ave., New York City.
Walker Sunlight Screen Co., 359 Canal St., New York City.
Westner & Son, C. S., 211 N. 13th St., Philadelphia, Pa.
Western Shade Cloth Co., 22nd and Jefferson Sts., Chicago, Ill.

Slides

Acme Slide Studio, 1026 Market St., San Francisco, Cal.
American Slide Co., 165 No. High St., Columbus, Ohio.
Erker Bros. Optical Co., 608 Olive St., St. Louis, Mo.
Excelsior Illustrating Co., 219 Sixth Ave., New York City.
Kansas City Slide Co., 1015 Central St., Kansas City, Mo.
Lochran, Wm. A., Film Exchange Bldg., Minneapolis, Minn.
Midland Cine Products Co., 706 First Ave., North Minneapolis, Minn.
Milano Slide Co., 112 W. Broadway, Salt Lake City, Utah.
Niagara Slide Co., Lockport, N. Y.
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Peerless Slide Co., 706 First Ave., No., Minneapolis, Minn.
Radio Mat Slide Co., 167 W. 48th St., New York City.
Ransley, J. F., 337 Madison St., W. Chicago, Ill.
Standard Slide Co., 209 W. 48th St., New York City.
Unique Slide Co., 168 W. 48th St., New York City.
Victor Animatograph Co., Davenport, Iowa.

Tachometers

Weston Electric Instrument Co., 4 Western Pl., Newark, N. J.
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Consolidated Instrument Co., 41 E. 42nd St., New York City.

Meters, Electrical

Weston Electrical Instrument Corp., 7 Weston Pl., Newark, N. J.
Jewell Electrical Inst. Co., 2 Vesey St., New York City.

How Many of These Can YOU Answer?

- How do you measure the E. F. of a compound projection lens?
 If the feed wires to the projection room were 000 copper and the manager changed his high amperage lamps to Reflector lamps, would you have different size wires installed?
 How can you test a projection lens for distortion?
 Does brilliancy of a projection screen surface have any effect on flicker?
 How is Direct Current obtained?
 What is residual magnetism?
 Can you alter the E. F. of a motion picture projection lens?

W. T.

New Rewinder Eliminator

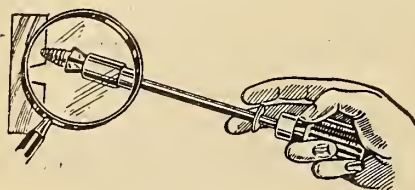
A new Film Rewinder Eliminator is now on demonstration at the offices of Hagenbacher and Bary at 1560 Broadway.

This new device embodies several novel features. The lower magazine houses a split reel. When taken apart the film can be lifted out easily and placed again in the top magazine which lies horizontally. In the upper magazine the roll of film is held in place by an adjustable band on a revolving table which is driven by a shaft directly connected to the take-up mechanism. The film unwinds from the center of the roll and is fed into the projector head by a series of guide-rollers. Its sponsors claim that they have succeeded in eliminating all strain on the film. The take-up reel is driven by an entirely new take-up mechanism connected to the main driving gear by a chain. The take-up consists of two parts: the hub on one side, and on the other a train of gears. They are locked together easily to form a solid reel. This sort of reel is necessary as the film is lifted bodily out of it and put into the upper magazine without rewinding.

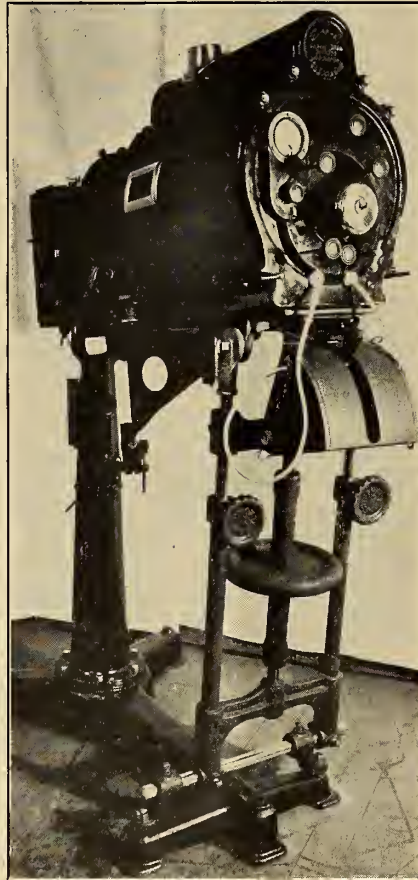
The developers of this device claim that with their system the life of a film is increased many times through the elimination of constant handling.

An Automatic Screw Driver

The Scroo-Grip Automatic Release Screw Driver shown below has been designed to simplify and make easier the work which ordinary screw



drivers perform under difficulties. It is easy to handle and easy in operation. This device has found favor with many projectionists, and should have a place in every tool kit.



Above is a picture of the new combination special lamp house carriage and adjustable braces designed to eliminate vibration. It is manufactured by Messtrum and is widely used. Note its solid construction and its graceful appearance.

New Intermittent Sprocket

A new intermittent sprocket and pin press, the invention of Morris Finkel, a projectionist of Drifton, Penn., will be ready for the market shortly.

This new device is intended to aid the projectionist in replacing worn intermittent sprockets in projectors, and is said by its sponsors to eliminate the damage caused by the use of a steel punch and hammer for this work.

The makers of this device stress as a feature the fact that it may be used on all makes of projectors, irrespective of what type of intermittent is continued therein.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

OF THE MOTION PICTURE PROJECTIONIST, published Monthly at New York, N. Y., for Apr. 1, 1928.

STATE OF NEW YORK } ss.
 COUNTY OF NEW YORK }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Boone Mancall, who, having been duly sworn according to law, deposes and says that he is the owner of THE MOTION PICTURE PROJECTIONIST, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Craft Publishing Co., 45 West 45th St., New York City; Editor, Boone Mancall, 45 West 45th St., New York City; Managing Editor, James J. Finn, 45 West 45th St., New York City; Business Manager, James J. Finn, 45 West 45th St., New York City.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Boone Mancall, 45 West 45th St., New York City.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is . . . (This information is required from daily publications only.)

BOONE MANCALL,
 Owner.

Sworn to and subscribed before me this 31st day of March, 1928.

C. W. WHITMAN,
 [Seal] (My commission expires March 30, 1929.)

Movietone Amplifying System

Prepared by Engineering Staff of
Electrical Research Products Branch of Western Electric Co.

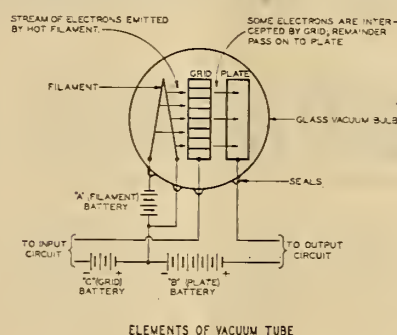
THE amplifying system forms one of the most vital links in the process of *Movietone* reproduction, and therefore some information on the subject will probably be of interest to projectionists. It will help greatly first of all to get a clear picture of the principle on which an amplifier works.

While various other means have been tried at different times in the past, practically all amplification required nowadays in radio, in telephony, and in voice and music reproduction by such means as the *Movietone*, is accomplished by the vacuum tube. Supposing we consider two metal terminals (or as they are called in vacuum tube work, *electrodes*) which are connected by wires to the poles of a battery or other source of current. As is well known, if these two terminals are held, say, an inch apart in the air, no current will pass, unless, of course, the voltage happens to be so great that the air insulation is broken down and a flash takes place.

If we go a step further and enclose the two electrodes in a glass bulb, from which the air has been exhausted, bringing the connecting wires through seals—just as is done in an ordinary electric lamp—the same will hold true—we will have no current except with very high voltages. However, if we find some means of making one of the electrodes red hot, and if this electrode is connected to the negative pole of the battery and the other electrode to the positive pole, it will be found that a small current passes. This is called the "Edison Effect" from its having been discovered by Edison about forty years ago in the course of his early researches on the development of the incandescent lamp. The hot electrode in this case was the carbon filament of the lamp. This phenomenon remained unexplained and unutilized until the early years of this century, when the progress of physics made it clear that the passage of current with the hot filament was due to

the fact that the latter emits electrons, which we can best think of as particles of negative electricity. Electrons fly off in all directions from a hot electrode enclosed in a vacuum tube, but if the tube contains a second electrode to which a positive voltage is applied, most of the electrons, being negative, will be attracted to the latter and will flow towards it in a steady stream. As an electric current is nothing but a stream of electrons, a flow of current between the two electrodes will be the result.

The fact that the electrons are at-



tracted to the positive electrode gives the clue to the further step necessary before this device can be used as an amplifier. Since a positive electrode attracts the negative particles, it seems reasonable to suppose that a negative electrode will repel them, and that if this negative electrode is inserted between the hot filament and the positive electrode it can be used as a gate or barrier to intercept the electron stream and enable it to be controlled as desired. This is the way in which the vacuum tube is used as an amplifier at the present time.

The positive electrode is what is known as *the plate*, and consists, in some tubes, of a small square piece of nickel and in others of a small cylinder of nickel. The barrier or gate to which the negative voltage is applied and which partly cuts off the electron stream is termed *the grid*, and consists of a small ladder-like structure of nickel wire interposed between the filament and the plate, or a spiral in the case of tubes with cylindrical plates.

Suppose now that it is desired to amplify a feeble alternating current representing voice or music pick-up.

This current is applied to the grid and causes the negative voltage on the latter to fluctuate according as the alternating voltage aids it or opposes it. Consequently, the stream of electrons, and therefore the current through the plate, likewise fluctuates. If the tube is properly designed and operated, the fluctuations occurring in the plate current will be an exact copy of the alternating current applied to the grid, except that they will be very much more powerful. It is very essential to the correct functioning of a vacuum tube that the negative voltage applied to the grid should be of the proper value. The filament used as a hot electrode in modern vacuum tubes is a platinum strip with a special oxide coating, which is chosen because of its ability to throw off large quantities of electrons when heated. As it is not practicable to get all the amplification required in *Movietone* from a single vacuum tube, several are employed to increase the power by steps, the plate output from one going to the grid of the next, through suitable circuit connections.

The custom has arisen of designating the battery supplying the heating current for the filament as the "A" battery, while the battery supplying the plate voltage is known as the "B" battery and the battery supplying the negative voltage for the grid is termed the "C" battery. Depending on the type and size of the equipment, some of the amplifiers used with *Movietone* employ storage "A" and "B" batteries and dry "C" batteries; other amplifiers are employed in which rectified alternating current furnishes all three types of supply; and in still other cases the supply is partly from batteries and partly from rectified AC. The operating instruction book which is supplied to each house describes in detail the types of amplifiers used on that particular job and the method of current supply.

Having got a clear picture of some of the fundamentals of an amplifier we are now in a position to intelligently consider how to take care of it and deal with such troubles as may arise.

(To Be Continued)

EXPERIENCED PUBLISHERS ARE SAYING

"The Growth of The Motion Picture Projectionist is amazing. It can be accounted for only by the fact that it is an extremely capable paper carrying the most vital information to a great craft which hitherto had no paper at all. It is drawing attention to a highly skilled section of the industry and is being rewarded by an avalanche of subscriptions and the business of a constantly growing list of advertisers."

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IN THIS
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24 ENTERPRISING ADVERTISERS

Every issue sees the entrance of more equipment manufacturers and distributors into the advertising columns of The Motion Picture Projectionist. In every case these advertisers are the acknowledged leaders in their fields. The same alertness that has placed them successfully at the top has brought them to advertise their products in these pages—because they realize that the man in the booth who uses their equipment is the man who has the deciding voice in its purchase. If he has to use he must be sold on it and the best minds of our equipment industry are realizing the truth of this more and more every day.

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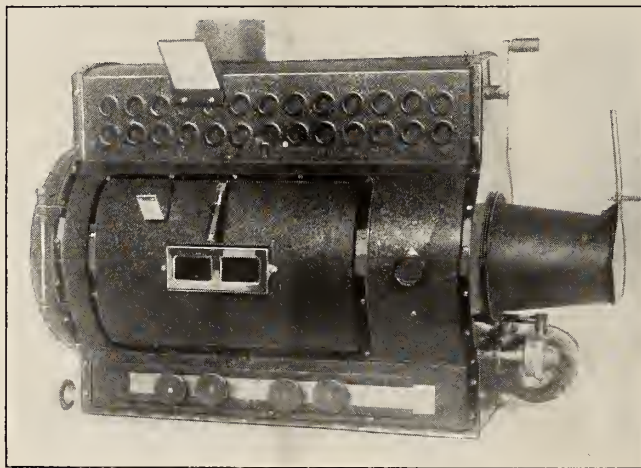


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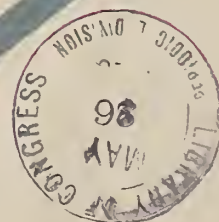
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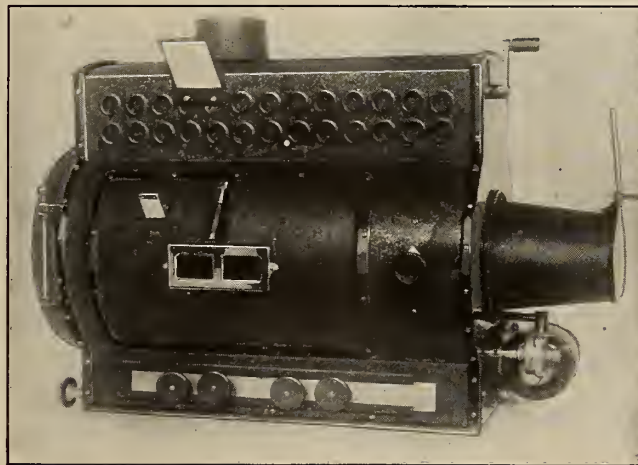
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NEW YORK CITY

THE MOTION PICTURE PROJECTIONIST

MAY, 1928

The Motion Picture Projectionist, 45 West 45th Street, New York

Vol. I—No. 7

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RCA's New "Talkie"

FORMAL public announcement of the new RCA "talking motion picture device," the RCA *Photophone*, was made by its sponsors, the Radio Corporation of America, in a full-page advertisement in the New York Times of May 11th.

It has been an open secret for some time now, of course, that the Radio Corporation of America would bring out this year still another entrant in the "talkie" derby. Yet, the announcement of the *Photophone* was somewhat of a surprise to many in the picture field, in that it was understood that the device was not yet ready for the market and would not be for some little time.

RCA—G. E.—Westinghouse

Specific information concerning the workings of the *Photophone* are not available at the present time, thus its workings are still as much of a secret as ever. It is understood, however, that the RCA device is, in everyday parlance, "great stuff," involving the application of every perfected refinement thus far effected in "talkie" experimentation. Naturally, the RCA label denotes a product which could hardly be less than good, what with the resources of that great organization being pooled in its manufacture. The device is announced as a product of "the Radio Corporation of America, the General Electric Company, and the Westinghouse Electric and Manufacturing Company," a combination of enormous resources and one able to market a device capable of offering stern competition to the "talkies" already in the field. The preliminary announcement of this device volunteers no information other than may be gleaned from the following passages:

"Embodying *revolutionary projection and acoustical improvements* (the italics are ours), RCA *Photophone* is as far removed from similar devices as the present-day radio is from its first models. Its public introduction has awaited "complete practicability" and the realization of its sponsors' ideals in sound amplification and tonal qualities. *Nothing equalling it in tonal perfection has ever been offered the theatres or the public.* . . .

"The human voice is reproduced by RCA *Photophone* as a *real voice* rather than as the emanation of some mechanical force. . . ."

The Griswold Splicer

The Griswold Machine Works of Port Jefferson, L. I., report that the Griswold Film Splicer is selling in greater volume today than ever before, despite the fact that this has always been a popular piece of projection room equipment.

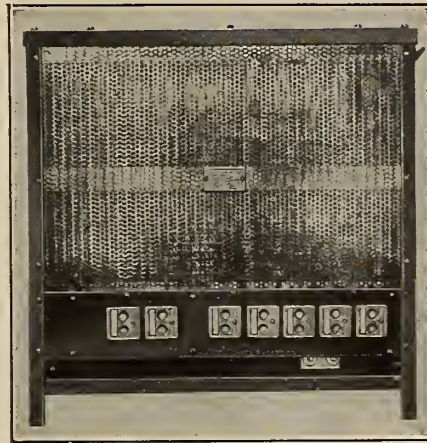
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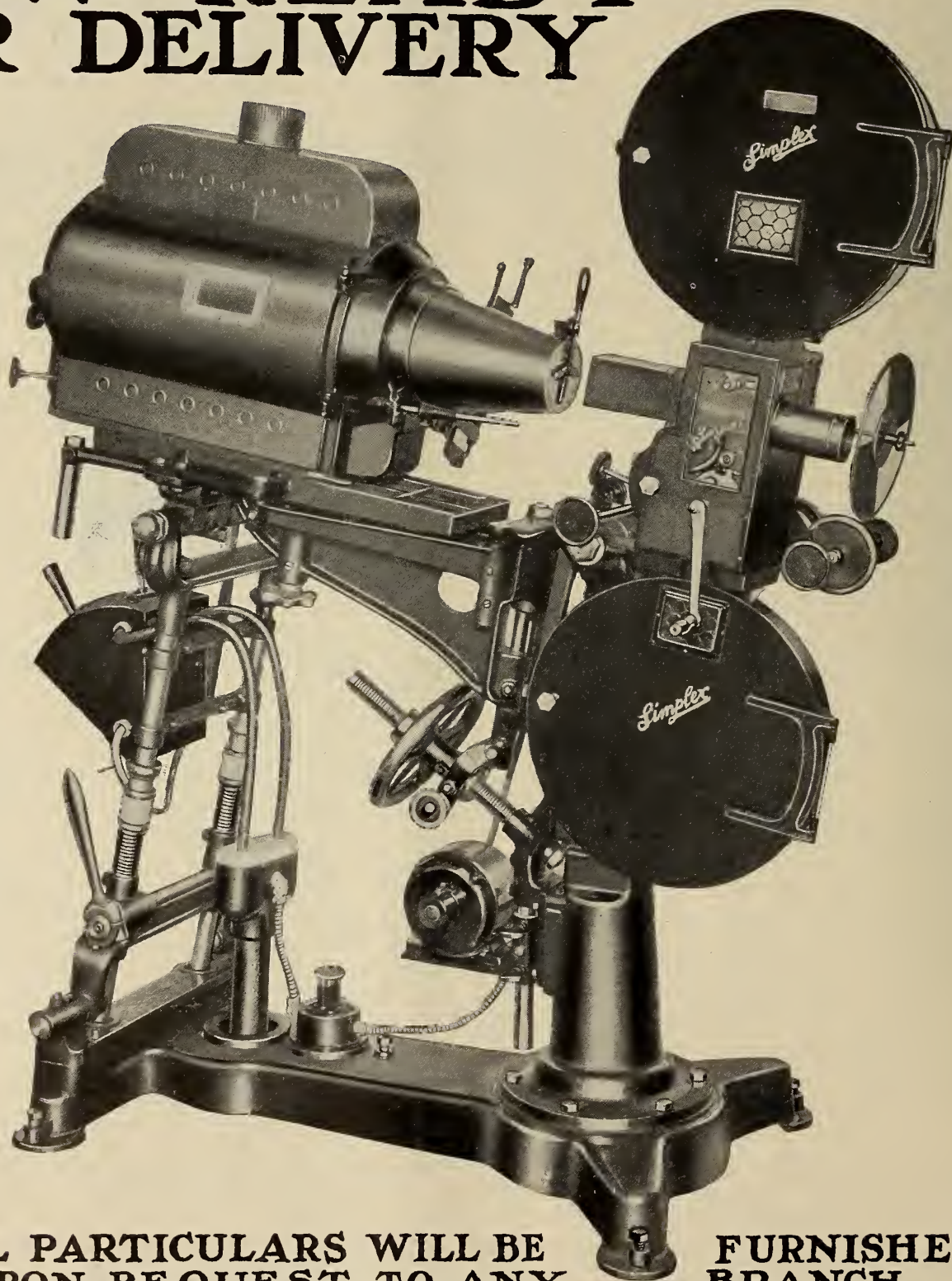
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By FRANK R. DAY

Recording Secretary Local 306

THE approach of the 29th biannual Convention of the International Alliance brings to mind the rapid rise to power and prestige of this important section of organized American labor. It is estimated that close to a thousand Delegates will gather in Detroit on June 4th, to pass on the work of the Alliance of the two years that are passing and to decide on the policies and personalities for the next two years. It seems but a short time ago when only sixteen Delegates gathered in the first Convention to vote for a President. It seems but a short time ago that William F. Canavan became such a brilliant I. A. executive. Yet the first meeting was held in 1893; and President Canavan has been holding important offices in the I. A. for fifteen years. It is a fascinating job to review the work and the changing faces during these years and we undertake it here in our humble fashion for the benefit of the thousands of new members who only recently were listed in the I. A. rolls.

Formed in 1893

The organization known today as the International Alliance of Theatrical Stage Employees and Motion Picture Machine Operators had its inception in July, 1893, and was then known simply as the National Alliance of Theatrical Stage Employees. The Operators played a very small role in the proceedings because the motion picture industry was then still very young and small and this now very powerful group was then still feeble and hardly worth noticing. Projection equipment was of the crudest type and early projectionists had nothing on which to try their mettle.

Only 9 Votes for President

The convention met in Elks Hall in New York. John G. Williams was elected president with nine votes. Sixteen votes were cast altogether. Some idea of the amount of business transacted at this Convention may be gleaned from the fact that in the book of the Combined Proceedings of all Conventions up to 1926 recently issued by the I. A. this first Convention takes up a page and a half. The report of the 1926 Convention in Cleveland takes up forty-six pages.

The second national gathering took place in Crystal Hall, Chicago, in 1894. For several years the conventions were held annually. Lee M. Hart stepped up to the Presidency from the Treasuryship. The usual business was transacted but at this Convention the real organization began to take shape. Basic resolutions were adopted, by-laws and amendments to the Constitution were accepted and when the delegates broke up to go home the Alliance had become definite in shape and purpose. Although changing conditions

since have forced many modifications and amplifications of policy and action, the International as it is today still retains the basic features of those early years.

32 Locals in 1895

Chandler Hall, Boston, 1895, was the scene of the third gathering. Claude L. Hagen, of New York, became the President. Thirty-one delegates were present. There were 32 Locals then in the Alliance, numbered from 1 to 32. Twenty of these sent representatives to Boston.

At this meeting it is notable to recall that a resolution of sympathy was adopted and telegraphed to the late Eugene V. Debs, then in jail in Illinois because of

Elks Hall, in Detroit, was the scene of the fourth annual Convention in 1896. P. Maloney of Boston was elected President at the end of the meeting. The Convention settled many vexing problems and fixed conditions and scales for different types and classes of work under its jurisdiction.

Buffalo was the scene of the 5th Annual Convention in 1897. The delegates met in Council Hall and selected Charles R. Norman of New York City as their next President. There were 55 delegates present representing 32 Locals which had a total membership of 2,315. Compare that figure with the I. A. membership today. Local 306 of New York City today has over 1,200 members.

Citizenship No Bar

The next year the Convention was held in Creighton Hall, Omaha. William Wiggins of St. Louis was elected President for the ensuing year. At this Convention it was decided that it was not necessary to be a citizen of the United States in order to occupy the President's chair, as the Alliance laws did not cover this point. It is not an important point, but it does reveal the thoroughness and the seriousness with which the Locals of that day approached the problem of founding a national organization that would become a permanent institution. We know how well they succeeded and how successfully the Alliance has been maintained at the top since. Forty-eight ballots were cast altogether for the election of officers. Four delegates did not vote. Wiggins was elected with 29 votes.

The 7th Convention was held in Richelieu Hall, Cincinnati. Wiggins was re-elected for another term. The work of building up the Alliance was carried on vigorously. It had the ups and downs that are associated with all such ventures. It cannot be said, for instance, that the Cincinnati Convention was able to look back upon the Alliance and give every officer from 1893 to 1899 a completely clean ticket. There were the usual jurisdictional disputes, struggles with Locals not altogether agreeable to the discipline exerted over them by the Alliance. But Convention by Convention, these were smoothed out and the Alliance gradually but surely forged ahead. More territories were being organized year by year; the number of Locals grew and with them the prestige and the power of the National body increased.

76 Locals in 1900

In 1900 the Convention assembled in the Brooklyn Athenaeum, Brooklyn, Joseph B. Fenton of Washington, D. C. Thirty-seven Locals sent delegates. Thirty-nine did not.

(Continued on page 24)



William F. Canavan

his leadership of the famous strike against the railroads of the late 90's. Later Debs became a Socialist and for many years was the inspired and inspiring leader of American Socialism.

Want "International" Title

At this Convention a Toronto delegate suggested that the name of the Alliance be changed from National to International so as to give Canadian Locals prestige in the organization. A motion was made but was decisively defeated, the delegates preferring the old name. This item bobbed up again in later conventions but was not adopted until 1902.

Craft Magazine

It was at this Convention that the need for a magazine for the craft was recognized. One was launched, but later it was given up.

Steady Projection

By O. F. SPAHR

Enterprise Optical Mfg. Co.

ASK any number of projectionists what is the primary reason for steady projection insofar as the projector is concerned and you will get a well-nigh unanimous answer: "A perfect intermittent movement."

That answer is not, however, 100 per cent correct, although we all will agree that a perfect intermittent movement is essentially necessary. There is a basic, underlying principle upon which the really worthwhile projector is designed and built which determines whether it will deliver rock-steady projection. Just as a modern skyscraper building must have footings resting way down to solid rock to sustain its enormous weight, so must a correctly designed projector have its solid foundation to insure delivery of steady projection.

In the early days of projector manufacture the manufacturers were mostly concerned with the mechanical problems of the mechanism, and these were met and many improvements originated without much concern being given to the stability and understructure of the projector as a whole. Most of us remember the projectors of the old days with the light, telescoping legs, and those of a later type with the round cast iron pedestal construction.

Vibration Eliminated

Motiograph engineers, recognizing the need for overcoming the unsteadiness of the screen image, due entirely to unsuitable construction of the projector base, found on investigation that since perfect intermittent movements and mechanisms had been developed and unsteady projection from that source eliminated, the one remaining problem was to design a base and understructure which would provide stability, rigidity, absence of vibration and even distribution of weight of the entire projector without making a projector either unsightly in design or cumbersome in construction.

Careful analysis of the problems presented resulted in the design of the floor base for the projector as shown in Figure 1. In this type of floor base construction it was possible to provide, first, ample floor area (19"x28") to sustain the weight of the entire projector. The design had also other desirable features in that being a hollow casing it was not unduly heavy nor cumbersome to ship, crate or handle, and would also permit the main feed wires and motor circuit for the projector to be brought up through the floor under the base. Its "flared-out" lines not only lent

beauty and symmetry to its design but provided strength as well.

Floor Contact

All of this, however, while providing a base that was sturdy, rigid and pleasing in appearance in itself, left still another point.



Fig. 1

to be considered insofar as rock-steady projection was concerned. This point was the all-important one—floor contact. All projection room floors are not absolutely even and flat, so provision must be made to care for this condition. This was accomplished by a method which not only provided absolute floor contact and solidity, but as well added another convenience in providing means to accurately adjust the projector so as to insure correct alignment of the projected image on the screen.

This principle is illustrated in detail in Figure 2, showing one of the four corners of the projector floor base. Here we see that what is termed a leveling screw has been provided. These screws provide four floor contact points. The weight of the

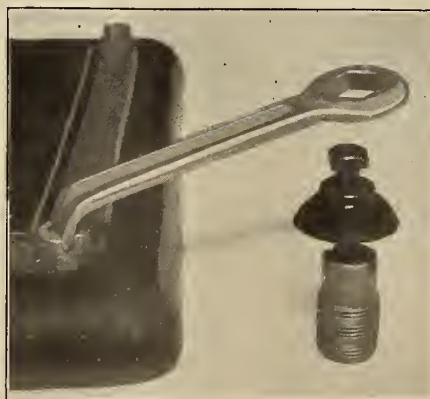


Fig. 2

entire projector resting on them and each being adjustable independently absolute floor contact is provided and alignment of the projected image is secured at the same time.

Upon this floor base of the projector (which might be considered analogous to the foundation of a building), the entire remaining assemblies of the projector are mounted. Here we encounter another point to which careful consideration in design must be given. The projector must be balanced so that vibration may be eliminated. Motiograph engineers have again studiously worked out this problem in the design of the lower magazine and lamphouse carriage support.

Even Distribution of Weight

In designing this unit, the lower magazine was constructed of a cast iron casting, the rear portion of which was worked out to provide the tilting bearing and segment and the supports which carry the slide rods for the lamphouse. As will be seen in Figure 3, this feature has been so designed as to provide a low center of gravity, bringing as much of the weight of the projector as possible to a low point. This design tends to overcome top-heaviness.

The distribution of weight was taken care of so that the different assemblies were balanced as near as is practical on either side of the tilting bearing.

In providing the tilting arrangement another problem was encountered in the necessity that the adjustment should be so designed as to provide easy accomplishment of the operation with a minimum of effort, and without risking the possible tipping over of the whole upper portion of the projector on the tilting bearing, as many projectionists will remember happening in the older type projector. This tipping over action was first eliminated in balancing the weight of the different assemblies as aforementioned. Slight off-balance resulting from different weights and positions of lamphouses was compensated for in the design of the tilting mechanism. Reference to Figure 4 will illustrate this point.

Tilting Device

Here we see the hand wheel, which governs the tilting operation, is connected to a screw shaft which engages with a cross shaft in the projector floor base. In the operation of tilting, the entire weight and balance of the projector is governed by this screw shaft, which will not allow any tilting movement unless the hand

(Continued on page 27)

How to Order Parts

By JOHN PROSS

THE purpose of these articles is to acquaint the projectionist with the necessity of having at least a working knowledge of Simplex or Kaplan Sure-Fit projector parts, so that when the occasion arises when new parts are needed he need not be at a disadvantage and may facilitate delivery of parts, many of which must be ordered in a hurry.

A projectionist need not necessarily know the number of every screw, spring, etc., in the projector, but he *should* know the *key letters* of each section as follows: A, B, C, D, E, G, and BB, the latter key letters signifying the double-bearing movement.

Key Letters Important

Admittedly the task of committing to memory the number of each part involves, in addition to the need for an excellent memory, the expenditure of much unnecessary effort and time which might well be directed in another direction. It is not, however, too much to ask the projectionist to familiarize himself with the identifying letters of each section. When a certain part is needed in a hurry, knowledge of these key letters will enable one to get better service from a dealer or manufacturer in that possible, even probable, mistakes will be precluded and prompt delivery assured.

Without a knowledge of the various key letters, a man might rack his mind trying to recall the particular key to a needed part and be unable to acquaint the dealer or manufacturer with his wants. Knowledge of the *key letters* of each section is, therefore, very necessary.

Since the publication of the first of this series of articles in last month's issue of *THE MOTION PICTURE PROJECTIONIST*, many projectionists have written in to say that the detailed listing of parts was a great help to them. It is safe to assume that with the final installment of the series, projectionists will be able to easily and quickly identify any and all parts they may need, resulting in simplifying the ordering of parts and making the chances of error almost nil.

In the last issue was presented the complete E section; and this month the C and D sections are listed. Anyone wishing to secure the first installment of this series may do so by writing to this paper.

The Various Assemblies

The A assembly of the mechanism includes the main frame and the base, and the sub-assemblies appertaining to same. It should be distinctly understood that anything which is a part of the main frame of the mechanism is included under the A parts list.

In the B assembly is included *anything* that pertains to the single-bearing intermittent movement. It is understood, of

Johnny Pross

Johnny Pross is well known to many projectionists throughout this country and Canada. Handling projection equipment is second nature to him. His projection room in the New Fillmore Theatre in San Fran-



cisco was long one of the show places of the West Coast and won the praise of every projectionist who saw it. Anyone interested in projection who traveled to the Mecca of the picture industry was advised not to miss seeing the Pross projection room. Johnny can name any part of the mechanism. His knowledge has been of great value in many theatres where a new kink suddenly revealed itself for which there was no apparent cause. Johnny is at present one of Sam Kaplan's ablest assistants in the Kaplan assembly factory.

course, that the double-bearing movements are covered in the BB assembly.

Assemblies C and D are listed in this

issue and are thoroughly explained.

The E assembly was explained in the April issue.

Included in the G assembly are *all* gears and shafts, and any part that has a working relation to the gears. This assembly will be listed in the next issue. These listings refer to Simplex and Kaplan Sure-Fit parts.

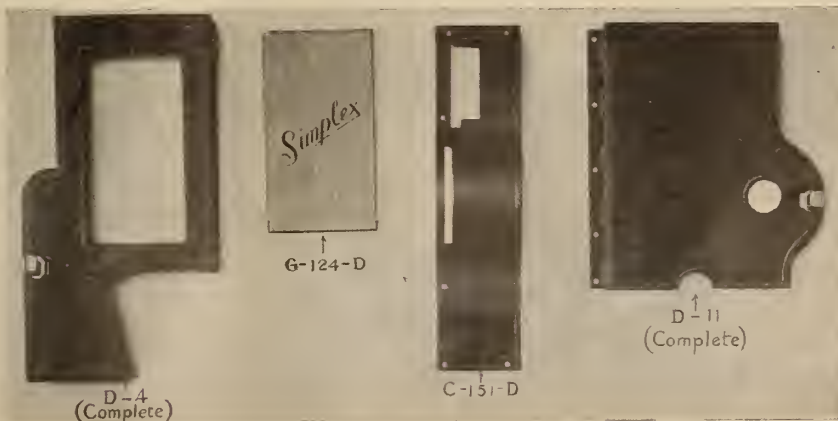
Guide Letters

With the exception of a few isolated instances, the guide letters to the various parts conform to the first letter of the part word. Thus, a gear will have a "G" guide letter; a shaft an "S" guide letter; a bearing a "B" guide letter. The single notable exception to this uniformity of guide letters to the part word will be noted in the listing of the Sprockets for the *single-bearing* intermittent Sprocket Wheel, where the guide letter is not "S" but "W," a derivation from the word wheel. But in the case of the listing of Sprockets for the BB (double-bearing) assembly, the guide letter is "S."

The exception cited above, together with several other similar instances of minor import, constitute the only digression from the uniformity of the guide letters. Therefore, if a pin is desired, the guide letter will be "P"; a knob will be found to have a "K" guide, a washer "W," a spring "S," and so on.

But the matter of memorizing the key letters of each section is one which is not made easy by uniformity of guide letters. This each projectionist must do for himself, for it is apparent that before one can locate any given part one must know in which section to look for that particular listing.

The important thing, therefore, is to become acquainted with the key letters of each section, and when this is done, the fact that the guide letters are so nearly uniform will enormously simplify the problem of ordering parts.



"C" MECHANISM ASSEMBLY**Complete "C" Mechanism Sub-Assemblies**

| | | |
|-------------|---------|---|
| C-2½ | | Upper Sprocket Roller Arm Complete Less Roller (Old Style). |
| C-1 | Arm: | Upper Sprocket Roller Arm Only. |
| N-115-C | Nut: | Upper Sprocket Roller Arm Nut. |
| S-194-C | Screw: | Sprocket Roller Arm Screw. |
| S-217-C | Screw: | Pad Roller Screw. |
| C-3½ | | Lower Sprocket Roller Arm Complete, Less Roller (Old Style). |
| A-115-C | Arm: | Lower Sprocket Roller Arm. |
| N-115-C | Nut: | Lower Sprocket Roller Arm Nut. |
| P-149-C | Pin: | Lower Sprocket Roller Arm Pin. |
| S-194-C | Screw: | Lower Sprocket Roller Arm Screw. |
| S-217-C | Screw: | Pad Roller Screw. |
| S-376-C | Stud: | Lower Sprocket Roller Arm Stud. |
| C-4 | | Film Trap Lever Assembly. |
| L-103-C | Lever: | Film Trap Door Lever. |
| S-102-E | Screw: | Film Trap Door Lever Spring Screw. |
| S-329-C | Spring: | Film Trap Door Lever Spring. |
| C-8 | | Upper Magazine Roller Holder Assembly. |
| H-130-C | Holder: | Upper Magazine Roller Holder. |
| R-160-C | Roller: | Magazine Roller, Small (2). |
| R-161-C | Roller: | Magazine Roller, Large. |
| S-485-C | Screw: | Magazine Roller Screw (6). |
| C-9 | | Governor Lift Lever Link Assembly. |
| L-110-C | Link: | Governor Lift Lever Link. |
| L-111-C | Link: | Governor Lift Lever Connect Link. |
| S-101-C | Screw: | Governor Lift Lever Connect Link Screw. |
| C-12 | | Pad Roller Stud and Arm Assembly. |
| K-127-C | Knob: | Pad Roller Stud Knob. |
| S-676-C | Stud: | Pad Roller Stud. |
| C-13 | | Upper Magazine Roller Holder (Mass. Req.) |
| B-260-C | Block: | Upper Magazine Roller Holder Block, Right. |
| B-261-C | Block: | Upper Magazine Roller Holder Block, Left. |
| P-374-C | Plate: | Upper Magazine Roller Holder Front Plate, Right. |
| P-375-C | Plate: | Upper Magazine Roller Holder Front Plate, Left. |

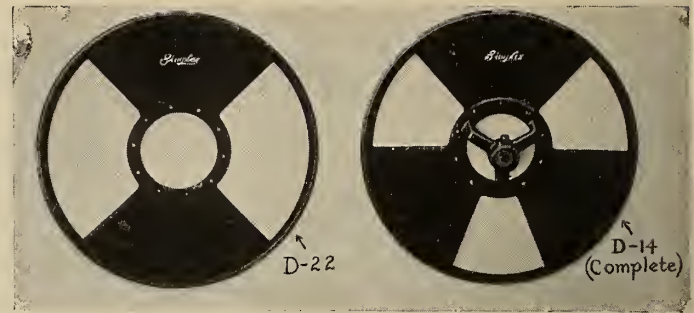
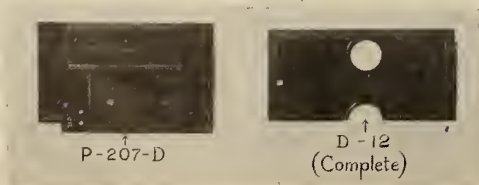
* These parts are not sold separately.

Complete "C" Mechanism Sub-Assemblies

| Part No. | Description |
|----------|---|
| P-373-C | Plate: Upper Magazine Roller Holder Back Plate. |
| R-227-C | Roller: Magazine Roller (4). |
| S-776-C | Screw: Magazine Roller Holder Plate Fastening Screw (10). |
| S-723-I | Screw: Lamp Holder Bracket Extension Screw. |
| S-775-U | Screw: Upper Magazine Arm Screw (2). |
| P-376-U | Plate: Upper Magazine Arm Distance Plate. |

"C" PARTS

| | | |
|---------|-------------|------------------------------------|
| A-100-C | Adapter: | Inside Lens Adapter. |
| A-104-C | Adapter: | Projecting Lens Adapter (outside). |
| A-136-C | Arm: | Upper Pad Roller Arm. |
| A-137-C | Arm: | Lower Pad Roller Arm. |
| C-157-C | Cover: | Right Cover. |
| C-286-C | Cover: | Right Front Cover. |
| E-100-C | Escutcheon: | Small Escutcheon. |
| E-101-C | Escutcheon: | Medium Escutcheon. |
| E-102-C | Escutcheon: | Large Escutcheon. |
| N-166-C | Nut: | Pad Roller Arm Nut. |
| P-102-C | Roller: | Pad Roller. |
| P-121-C | Pin: | Film Trap Locating Pin. |
| P-202-C | Plate: | Name Plate. |



| | | |
|---------|-----------|--|
| P-289-C | Pin: | Roller Arm Stop Pin. |
| S-101-C | Screw: | Automatic Shutter Link Hinge Screw. |
| S-102-E | Screw: | Automatic Fire Shutter Lift Link Ret. Screw (2). |
| S-122-C | Screw: | Cover Screw. |
| S-133-C | Screw: | Film Trap Screw. |
| S-137-C | Screw: | Film Trap Door Trip Lever Pivot Screw. |
| S-150-C | Screw: | Governor Lift Lever Pivot Screw. |
| S-165-C | Screw: | Right Cover Fastening Screw. |
| S-248-A | Screw: | Roller Holder Screw. |
| S-278-A | Screw: | Upper Reel Friction Spring Screw. |
| S-514-C | Stud: | Automatic Fire Shutter Lifting Stud. |
| S-567-C | Stud: | Pad Roller Arm Stud. |
| S-572-C | Stripper: | Upper and Lower Sprocket Film Stripper. |
| S-573-C | Stud: | Upper and Lower Sprocket Film Stripper Stud. |
| S-706-C | Screw: | Pad Roller Arm Screw. |
| W-145-D | Wheel: | Upper Feed Sprocket. |
| W-146-D | Wheel: | Lower Takeup Sprocket. |
| W-160-C | Washer: | Pad Roller Arm Washer. |
| W-127-D | Sprocket: | Lower Takeup Sprocket, Old Style. |
| W-141-D | Sprocket: | Upper Feed Sprocket, Old Style. |

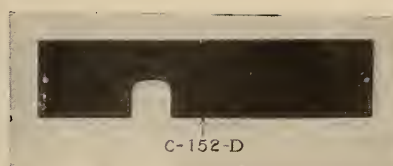
* These parts are not sold separately.

"D" OUTSIDE MECHANISM ASSEMBLY**Complete "D" Sub-Assemblies**

| Part No. | | Description |
|----------|------------|---|
| | D-1 | Driving Arm Assembly. |
| A-108-D | Arm: | Driving Arm. |
| H-109-D | Handle: | Driving Arm Handle. |
| P-209-D | Plug: | Driving Arm Retaining Plug. |
| S-124-D | Screw: | Driving Arm Screw. |
| S-366-D | Stud: | Driving Arm Stud. |
| W-103-D | Washer: | Driving Arm Washer. |
| | D-2 | Governor Lift Lever Assembly. |
| L-105-D | Lever: | Governor Lift Lever. |
| S-493-D | Screw: | Governor lift Lever Screw. |
| | D-3 | Governor Weight and Links Assembly (Set only). |
| L-112-D | Link: | Governor Weight Link. |
| S-100-E | Screw: | Governor Weight Screw. |
| W-126-D | Weight: | Governor Weight. |
| | D-4 | Right Door Assembly (Includes D-17). |
| D-128-D | Door: | Right Door. |
| S-192-D | Screw: | Right Door Hinge Screw. |
| | D-5 | Right Door and Knob (Includes D-4). |
| K-132-D | Knob: | Door Knob. |
| S-178-D | Screw: | Door Knob Screw (2). |
| | D-6 | Right Door Lock Spring and Button Assembly. |
| B-138-D | Button: | Right Door Lock Spring Button. |
| S-348-D | Spring: | Right Door Lock Spring. |
| | D-7 | Right Back Cover Hinge Assembly. |
| H-152-D | Hinge: | Right Back Cover Hinge (2). |
| P-262-D | Pin: | Right Back Cover Hinge Pin. |
| S-346-D | Spring: | Right Back Cover Hinge Spring. |
| | D-8 | Right Back Cover Latch Knob Assembly (Used on D-9 old style only). |
| K-109-D | Knob: | Right Back Cover Latch Knob. |
| L-100-D | Latch: | Right Back Cover Latch. |
| P-153-B | Pin: | Right Back Cover Latch Pin. |
| S-347-D | Spring: | Right Back Cover Latch Spring. |
| | D-9 | Right Back Cover (Old Style) (Includes D-7 and D-8). |
| C-213-D | Cover: | Right Back Cover. |
| S-106-D | Screw: | Right Door Hinge Screw (3). |
| S-185-D | Screw: | Right Back Cover Lock Stop Screw. |

| | |
|---------|--|
| D-9 | Right Back Cover (New Style) (Includes D-7). |
| C-285-D | Cover: Right Back Cover. |
| S-106-D | Screw: Right Door Hinge Screw (3), each. |
| S-185-D | Screw: Right Back Cover Lock Stop Screw. |
| D-10 | Upper Left Door Assembly (Includes D-18). |
| D-108-D | Door: Upper Left Door. |
| S-192-D | Screw: Upper Left Door Hinge Screw (5). |

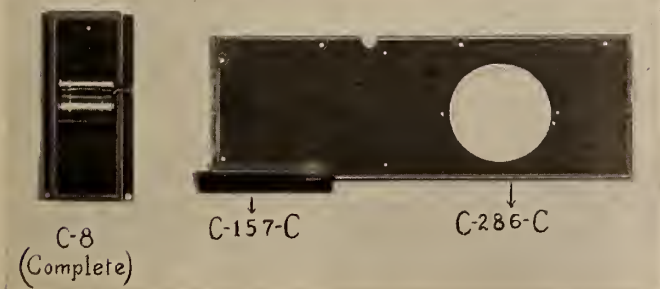
* These parts are not sold separately.



Complete "D" Sub-Assemblies

| Part No. | Description |
|----------|--|
| D-11 | Upper Left Door and Knob Assembly (Includes D-10 and D-18). |
| K-106-D | Knob: Left Door Knob. |
| P-205-D | Plate: Triangular Warning Plate. |
| S-102-E | Screw: Triangular Warning Plate Screw (3). |
| S-178-D | Screw: Left Door Knob Screw (2). |
| D-12 | Lower Left Door Assembly (Includes D-19). |
| D-105-D | Door: Lower Left Door. |
| S-192-D | Screw: Lower Left Door Hinge Screw (2). |
| D-13 | Shutter Spider Assembly. |
| S-566-D | Spider: Shutter Spider. |
| S-165-C | Screw: Shutter Spider Screw (2). |
| D-14 | Three Wing Shutter and Spider Assembly (Includes D-13). |
| D-27 | Shutter: Three Wing Opaque Shutter. |
| S-106-D | Screw: Shutter Screw (5). |
| D-15 | Stereo Slide and Arm Assembly. |
| A-122-D | Arm: Stereo Slide Arm. |
| K-103-D | Knob: Stereo Focusing Knob. |
| P-191-D | Pinion: Stereo Focusing Pinion. |
| P-249-D | Pin: Stereo Arm Pivot Pin. |
| S-125-B | Screw: Stereo Arm Set Screw. |
| S-141-A | Screw: Stereo Focusing Knob Set Screw. |
| S-155-R | Screw: Stereo Slide Arm Wing Screw. |
| S-264-D | Screw: Stereo Lens Adjusting Screw. |
| S-324-D | Slide: Stereo Slide. |
| D-16 | Top Plate and Stereo Slide Assembly (Includes D-15). |
| L-113-D | Link: Left Door Stop Link. |
| P-207-D | Plate: Top Plate. |
| S-106-D | Screw: Stereo Slide Stop Screw. |
| S-181-D | Screw: Left Door Stop Link Screw. |
| S-189-W | Screw: Top Plate Screw (2). |
| S-343-A | Spring: Stereo Slide Rack Arm Spring. |
| S-125-B | Screw: Stereo Screw. |
| D-17 | Right Door Hinge Assembly. |
| H-151-D | Hinge: Right Door Hinge (2). |
| P-264-D | Pin: Right Door Hinge Pin. |
| D-18 | Upper Left Door Hinge. |
| H-155-D | Hinge: Upper Left Door Hinge (2). |
| P-265-D | Pin: Upper Left Door Hinge Pin. |
| D-19 | Lower Left Door Hinge Assembly. |
| H-150-D | Hinge: Lower Left Door Hinge (2). |
| P-266-D | Pin: Lower Left Door Hinge Pin. |
| D-22 | Two Wing Opaque Shutter Regular. |
| D-23 | Two Wing Shutter and Spider Assembly (Includes D-13 and D-22). |
| S-106-D | Screw: Shutter Screw (5). |
| D-27 | Three Wing Opaque Shutter Regular. |
| D-33 | Two Wing Opaque Shutter for No. 2 Lens. |
| D-34 | Three Wing Opaque Shutter for No. 2 Lens. |

* These parts are not sold separately.



Complete "D" Sub-Assemblies

| Part No. | Description |
|-----------|---|
| D-35 | Two Wing Extralite Shutter and Spider Assembly (Regular) (Includes D-13). |
| D-32 | Shutter: Two Wing Extralite Shutter. |
| S-192-D | Screw: Shutter Screw (5). |
| D-36 | Three Wing Extralite Shutter and Spider Assembly (Regular) (Includes D-13). |
| D-30 | Shutter: Three Wing Extralite Shutter. |
| S-192-D | Screw: Shutter Screw (5), each. |
| D-43 | Door Linkage Device. |
| A-153-D | Arm: Right Door and Right Back Cover Arm. |
| L-148-D | Link: Lever Link. |
| L-149-D | Lever: Right Door and Right Back Cover Lever. |
| L-150-D | Link: Cover Connecting Link. |
| P-340-D | Pin: Right Door and Right Back Cover Pin (7). |
| S-192-D | Screw: Lower Magazine Cover Knob Screw (6). |
| S-737-D | Screw: Linkage Device Headless Set Screw. |
| D-49 | Two Wing Opaque Shutter and Spider for No. 2 Lens (includes D-13 and D-34). |
| S-106-D | Screw: Shutter Screw (5). |
| D-50 | Three Wing Opaque Shutter and Spider for No. 2 Lens (Includes D-13 and D-34). |
| S-106-D | Screw: Shutter Screw (5). |
| D-51 | Two Wing Extralite Shutter and Spider for No. 2 Lens (Includes D-13). |
| D-45 | Shutter: Two Wing Extralite Shutter for No. 2 Lens. |
| S-192-D | Screw: Shutter Screw (5). |
| D-52 | Three Wing Extralite Shutter and Spider for No. 2 Lens (Includes D-13). |
| D-31 | Shutter: Three Wing Extralite Shutter for No. 2 Lens. |
| S-192-D | Screw: Shutter Screw (5). |
| "D" PARTS | |
| C-118-D | Clamp: Right Door Glass Clamp. |
| C-151-D | Cover: Left Back Cover. |
| C-152-D | Cover: Left Front Cover. |
| G-124-D | Glass: Right Door Glass. |
| K-106-D | Knob: Right Door Knob. |
| P-144-D | Pin: Left Door Lock Pin. |
| P-153-B | Pin: Left Door Lock Spring Taper Pin. |
| P-341-D | Pin: Cover Linkage Locking Pin. |
| R-162-D | Roller: Right Back Cover Stripper Roller. |
| S-106-D | Screw: Right Door Glass Clamp Screw. |
| S-122-C | Screw: Cover Screw. |
| S-180-D | Screw: Lower Left Door Retain Screw. |
| S-181-D | Screw: Left Door Stop Link Screw. |
| S-192-D | Screw: Right and Left Door Hinge Screw. |
| S-246-D | Screw: Right Door Knob Fastening Screw. |
| S-338-D | Spring: Left Door Lock Spring. |
| S-771-D | Screw: Right Back Cover Stripper Roller Screw. |
| S-787-D | Screw: Left Front Cover Screw. |
| W-145-D | Sprocket: Upper Sprocket. |
| W-146-D | Sprocket: Lower Sprocket. |
| W-127-D | Sprocket: Lower Sprocket (Old Style). |
| W-141-D | Sprocket: Upper Sprocket (Old Style). |

* These parts are not sold separately.

As *The* EDITOR Sees It

T ¶ *Delegates—Greetings!*

TO the Delegates of the various Locals of the International Alliance assembled in Detroit for the twenty-ninth Convention meetings! This is the first occasion THE MOTION PICTURE PROJECTIONIST has had to extend greetings to a national convention of the International. It does so with the sincerest wishes for the best welfare of the national organization and the Locals. It is full of optimism in the still greater future in store for the crafts it represents. It is proud to play a part in the new developments that are coming thick and fast and which are raising the craft of projection high in the eyes of the entire amusement world. It is our hope that THE MOTION PICTURE PROJECTIONIST will be on hand early at each succeeding Convention, always to extend the hand of co-operation and to do its share to advance the interests of the craft and every individual in it. On another page of this issue, where we record briefly the engrossing history of the International Alliance from its inception back in 1893 down to the present, we mention the Journal which the International started years back, which ran along for some time and then was withdrawn from circulation. That was a move in the right direction and it inspired the bringing out of this publication. It was recognized that this growing craft needed a publication of its own through which technical and other interesting information could be transmitted back and forth among the membership; a publication by which the entire membership could be linked together; chiefly to have an organ which could represent it to the outside world. THE MOTION PICTURE PROJECTIONIST attempts wholeheartedly to fill such a place. It has already received the support of a large section of the I. A. and it is our hope that its constant effort to be of service will finally make it an indispensable feature of the craft.

W ¶ *The Complaint Department*

WE are glad to see that more projectionists are availing themselves from month to month to clear their troubles with film and equipment through our Complaint Department. We do not have room to print all the communications we receive almost daily from readers outlining various difficulties they are having and asking us to get in touch with the companies for possible remedies. In almost every case we succeed in having the helpful changes made. We urge more projectionists to avail themselves of this Department.

N ¶ *Thank You—*

NOR have we room to publish all the wonderful letters we receive praising this paper. Our office files are loaded with hundreds of letters, coming from every point in the country. It has been a constant stream of encouragement. We have not had time to answer them all. But we wish to thank every one who has written to us. We want you to write more often. Our thanks also to President Canavan for the kind assistance he has given

us from time to time to help us get the proper perspective in this publishing venture and for the sound advice he has extended whenever it was solicited to help us solve some particularly knotty problem. Our appreciation also to Sam Kaplan, President of Local 306, who has been our guide and our inspiration since we started; to 306 officers, all of whom have helped to speed this paper on its way; to Tommy Malloy of Chicago, who was first among those to wish us God-speed and to help us in many ways, and, finally, since lack of space does not permit mention of them all by name, to the several hundred secretaries and to the thousands of our subscribers who have supported this paper from the very beginning. To all—our deepest appreciation.

W ¶ *What's On Your Mind?*

WE urge all projectionists to constitute themselves regular contributors to this magazine. We are glad to receive and publish all information from members of the craft. We feel that in their work they meet with experiences, problems, out-of-the-ordinary situations which other members of the craft would like to know about. We are always soliciting articles from laboratory engineers and other experts in projection but the most interesting contributions we have printed so far have been those sent in to us by members of the craft. Don't hesitate to write in.

T ¶ *Dawn of a New Day*

TALKING pictures have definitely come to stay as a part of the motion picture industry. When *Vitaphone* was first brought out, it was hailed as a revolutionary event in pictures. But there were many who scoffed at it as a passing fad that would strut its brief hour upon the screen and vanish. But then came *Movietone*. Other devices were announced and it was reported that all the big film companies, including Metro-Goldwyn and Paramount, were interested in getting talkies for themselves. Finally came the R. C. A. *Photophone*, broadcast to the public in full page ads. in the newspapers. That definitely fixed "Talkies" as a permanent institution in the film industry. There is money, brains and endurance back of a large company like R. C. A. and if they do not bring out the perfect device at once they will persist until they do. Projectionists are going to benefit immeasurably. Wages and conditions must improve all over the country. The prestige of the craft has risen over night. And there is more in the future. There are color films and extra-dimensional films, all of which may need extra equipment and extra skill. The new day for the craft has indeed dawned.

Boone Manneall
 Publisher and Editor.

New H. & C. Spot

By THEODORE HALL

HALL & CONNOLLY, Inc., of New York City, have recently placed on the market a new high intensity spot lamp, the result of many months preparation involving considerable research and the application of many recent developments in the employment of the high intensity lamp to the motion picture field.

The advantages of this new Hall & Connolly product are many, and its sponsors enumerate the following:

- (1) As compared with the present spot lights using the ordinary carbon arc, the new spot light has many advantages, the principal one being its ability to give about three times the amount of illumination for a given amount of current or amperage.
- (2) A much better quality of light: A pure white light in place of the usual brownish-yellow obtained from the carbon arc . . . Brings out the colors in a much more pleasing manner. . . Has the appearance of strong sunlight when used as a flood without colors.
- (3) Always a perfect round spot; never heart-shaped nor oval. . . No "burning in" of the carbons to obtain a clean spot.
- (4) So flexible that a number of effects, heretofore impossible, can be accomplished with great ease.
- (5) A combination spot, flood and effect machine.

Problems of H. I. Adaption

Many difficulties have attended the adoption of the high intensity lamp as a light source for spotlights. It has long been known that the elimination of certain objectionable features peculiar to these high efficiency arcs would make available an ideal light source for this class of work. Hall & Connolly confidently assert that in their new spot this has been accomplished and a thoroughly practical outfit is the result.

Increased Efficiency

The brightness of the present carbon arc crater is about 150 candlepower per square millimeter; while that of the high intensity arc is approximately 800 candlepower. But if we should use a high intensity arc in an ordinary spotlight housing with the ordinary optical "set up" we should have distortion of the spot, a very objectionable image of the arc flame and bright tip of the negative carbon, in addition to the desired image of the real or main light source—the positive crater. It has been

necessary, therefore, to work out an entirely new plan of employing the arc in this new spotlight.

The procedure in working out this plan is as follows:

A regular high intensity projection lamp and lamphouse is mounted on a suitable adjustable and counterbalanced stand. A movable condenser lens carriage is provided in the lamphouse so that the light may be focused without moving the lamp burner.

On the front of the lamphouse extending forward are two parallel guide rods upon which are mounted in a fixed position an iris shutter and a square masking shutter. In front of these and sliding freely on the guide rods is a 6-inch objective lens. A bell crank-handle is pivoted on the iris shutter mount and extends back to where it is conveniently within reach of the projectionist. This handle is geared to the iris shutter so that movement of the handle varies the size of the aperture in the shutter.

Coupled to this same handle, by means of adjustable rods or links, is the condenser holder carriage (in the lamphouse) and the objective lens out in front of the iris shutter, so that moving the operating

handle accomplishes simultaneously three things: (1) opening and closing iris diaphragm (2) moving condensers back and forth, and (3) focusing objective lens. A suitable color box and its operating mechanism is provided. The stand is equipped with spring counterbalance and hydraulic stabilizer. Operating instructions are as follows:

Operating Instructions

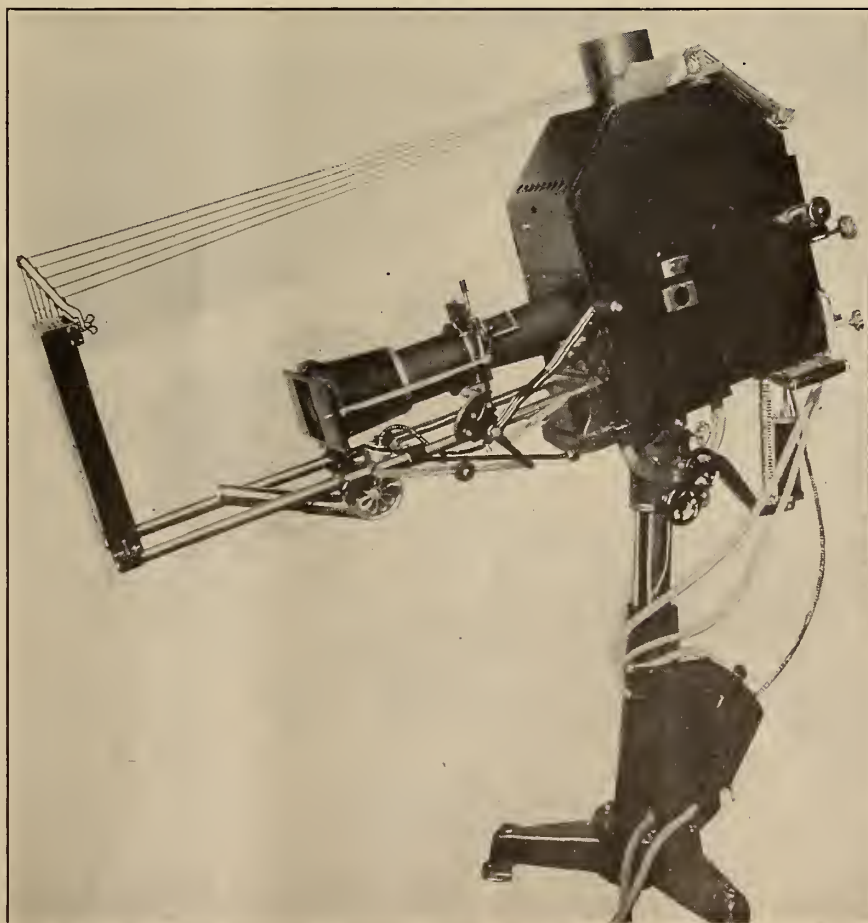
By the independent adjustments on the various units the following initial settings are made:

- (1) With the operating handle in the position for the smallest spot, the iris is set for smallest opening.
- (2) The condensers are so adjusted that the spot just covers the opening of the iris.
- (3) The objective lens is focused for the desired sharpness of the spot.

With these settings made, the independent adjustments can be locked or secured so that the various effects may be secured by simply moving the operating handle.

Principle Involved

The principle involved is as follows:
(Continued on page 29)



A B C of Sound Reproduction

Prepared From Material Supplied by
Electrical Research Products Branch of Western Electric Co.

THE following description covers in a broad manner the application and outstanding technical features of Western Electric Sound Projector Systems as used in theatres for "talking motion pictures," and for music reproduction, voice re-inforcement or announcing. For the benefit of those who have not yet laid the groundwork necessary for a full appreciation of the workings of the various systems, the introductory phase will be repeated. Articles which appeared in earlier issues covered only very sketchily this phase of the subject, and in line with the revised policy of this paper in the presentation of talking devices material, this subject will be outlined again.

Detailed operating instructions for any particular subject will not be given in this series of articles, but are to be had with each installation of equipment and are supplemented with personal instruction at that time. Servicing and inspection of all equipments is provided by the company making the installation.

Applications of Equipment

Western Electric Sound Projector Systems can be used for any or all of the following purposes, the type of apparatus installed depending on the use to which it is to be put.

In the two types of application the voice or music is always synchronized with the picture—that is, the sound is heard at the same instant that the action producing it is seen on the screen. or, in the case of synchronized accompaniments to features, where the musicians are usually not seen in the picture, the score is cued before recording so that as each scene changes in the picture, the corresponding change in the character of the music takes place at the same instant. Hence, this is called synchronous reproduction.

Projectionists are not likely to have occasion to use the non-synchronous apparatus, and the same applies to the system for voice amplification, which functions like the W. E. Public Address System, and to the Announcing System for theatres, in which a small

FOREWORD

This is the first of a series of articles which, beginning with the elements of the sound reproducing apparatus, will cover the subject as comprehensively as is possible. General information being desirable to enable the projectionist to fully appreciate the application of the thirteen different systems now in operation, specific operating instructions for any particular system will be given as far as possible. This does not mean that detailed instructions of the component parts of the various systems will be omitted. On the contrary, detailed information will be given and reader discussion encouraged. Participation of projectionists in the discussions of the various problems demanding attention is urged.—THE EDITOR.

microphone pick-up arrangement is used to announce coming attractions, emergency calls, etc.

Methods of Recording

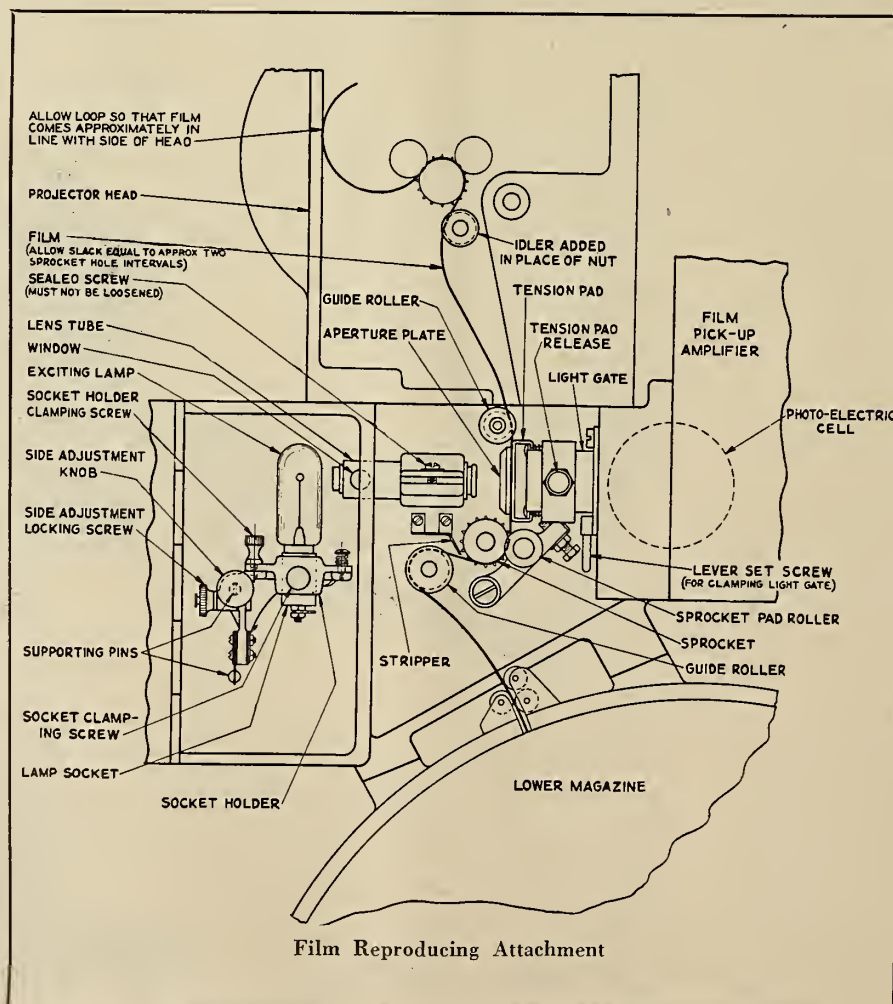
Two methods of recording are employed. In one, called the disc method, the record is on a disc similar to a phonograph record. This is used by Vitaphone. In the other, known as the film method, the sound record is photographed on the film. Movietone employs this system. Theatre equipment is available which can be used with either of these methods or both. The only difference lies in the pick-up apparatus used at the projector. The amplifiers and horns are identical in both systems. Productions of both types can be used on the same program, as a simple switching operation permits immediate change from one method to another.

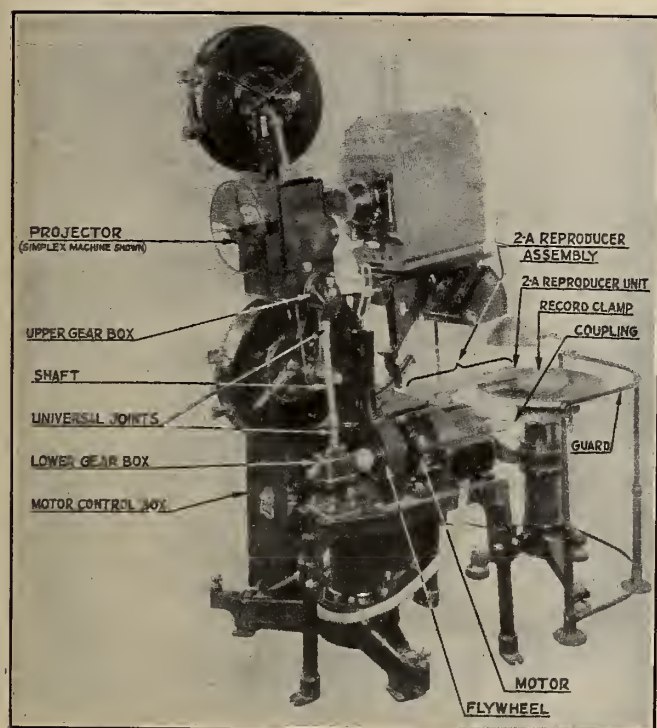
Recording is done electrically with both methods. The voice or music to be recorded is picked up by a microphone which generates a small electric current whose variations correspond to the sound waves. In disc recording, this current controls an electro-magnetic recording stylus, whose

movements cut the record on a wax disc in the usual manner, the undulations of the groove corresponding to the sound waves. In film recording, the amount of light falling on a moving film is made to vary in accordance with the fluctuations of the microphone current, and so a photographic record corresponding to these fluctuations, and therefore to the voice or music, becomes impressed on the film.

Synchronous Reproduction

The first step in synchronous reproduction is to generate a small electric current whose variations correspond to the sound waves forming the voice or music that was recorded. Depending on which of the two previously mentioned methods of recording was used, this current is obtained either from an electrical reproduction playing on a disc record (Vitaphone), or from a film reproducing attachment through which the film





Disc-and Film-Equipped Projector

passes on leaving the projector head.

Disc Records

The disc records employed are similar to the best types of phonograph record except that they are much larger and run at about one-half standard speed; this enables each record to play throughout a whole reel. The film used with the disc record, called a synchronized film, is similar to any ordinary film, except that one frame at the beginning is specially marked to give the starting point.

Film Record

With the film method (Movietone) the sound record consists of a band about $\frac{1}{8}$ in. wide, called the sound track, which runs down one side of the film and consists of microscopic lines. The spacing of these lines at each point depends on the pitch of the sound which was recorded at that moment. The difference in density of the lines depends on the loudness of the sound—that is, the greater the contrast between light and dark lines, the louder the sound. Such a film is called a sound film, and is otherwise similar to an ordinary film. After leaving the lower sprocket of the projector head, the sound film enters the reproducing attachment where it passes over a sprocket that moves along at constant speed. A narrow beam of light from a high-intensity exciting light is focused on the sound track of the film through a system of lenses and an aperture plate. The light which has passed through the moving film will then vary in intensity according to the variations of the lines recorded on the sound-track. The light falls on a photoelectric cell, which produces a small electric current whose variations correspond to the light, and therefore to the sound which was recorded.

Amplification

The small current from the electrical reproducer or the photoelectric cell passes along to one or more vacuum tube amplifiers similar in principle to those used in

the audio-frequency stages of radio sets; these amplifiers deliver a greatly magnified copy of this current.

Sound Projectors

The current from the amplifiers is converted into sound by means of sound projectors consisting of receivers and horns located on the screen. The numbers of horns used, and their exact location, depend on the size and acoustic properties of the theatre. Usually a special type of screen is employed, which reflects light well and enables a good picture to be obtained, but is practically transparent to sound waves. The horns are placed immediately behind the screen so that a perfect illusion that the voice or music is coming from the speakers

and artists seen on the screen is obtained in all parts of the theatre. Obviously, if the sound is not coming directly from the screen, the illusion is lost.

The horns used in all these systems can be mounted in such a manner that they are removable whenever the stage is used for purposes other than pictures. This can be done either by flying them or mounting them on towers that are easily and quickly movable.

Synchronism

In the disc method (Vitaphone), perfect synchronism between sound and picture is assured by having the projector and the turntable carrying the record both driven by the same motor; hence if the film and record are started together they must necessarily keep in step throughout the remainder of the reel. In the film method (Movietone), the fact that the sound record is on the same film with the picture makes synchronism inherent provided that the film is set up in the attachment with the proper loops to ensure that when a picture is at the picture aperture in the projector head, the accompanying portion of the sound track will be at the light aperture in the reproducing attachment.

The Fader

By using two projectors alternately, a continuous program can be run just as with ordinary pictures. A device called the "fader" is employed in making the transition from one machine to the other, which can be effected with no break in the music or voice. All that is necessary for this purpose is to turn the fader knob when the incoming machine is started. Auxiliary fader positions permit of making the change from any projector position.

At the end of each record or sound film, the music overlaps the opening notes of

the next, so that with proper operation the audience is unaware of any change being made. The volume of sound heard in the theatre is also controlled by the fader.

Speed Regulation

The film reproduction attachment is driven through gears and universal joints toward the forward end of the motor, while the turntable is similarly driven from the rear end.

In ordinary picture projection, the film is usually shown at a faster speed than it was taken. However, this cannot be done with a synchronized film or a sound film, as the pitch would be changed and this would cause the voice or music to be distorted or spoiled. All synchronous subjects have therefore to be shown at exactly the same speed they were made, which is 90 feet per minute. This speed is maintained automatically by means of a special type of motor and an electrical governing system contained in the motor control box.

To permit of running films other than synchronized numbers in the usual manner, means are provided on the motor control box for regulating the speed within the usual range employed in projection.

Mechanical Filter

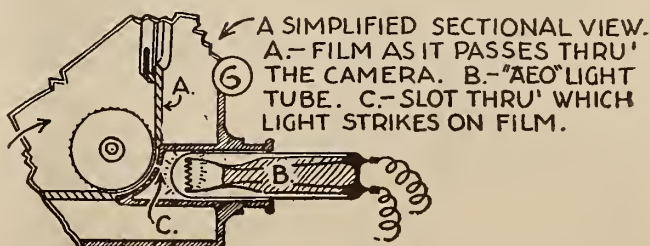
In all mechanical equipment using gears, etc., vibrations and speed fluctuations are produced. Even when the most accurate manufacturing processes have reduced such disturbances to a point where they would be quite negligible in any ordinary mechanism, their effect might, in the case of apparatus for sound reproduction, be noticeable to the listener as a kind of "flutter" or tremolo. This effect is completely eliminated in both the disc and film reproducing attachments, by means of special spring drive systems for the turntable and the film sprocket, respectively. This important refinement is called a mechanical filter.

Other Systems

Non-synchronous reproduction is essentially similar to synchronous disc reproduction, already described, with the difference that since the record does not have to be synchronized with the film, it is not necessary to drive projector and turntable by the same motor; therefore the turntable need not be in the projection room but can be in any part of the theatre which permits a view of the screen.

Voice amplification systems for theatres, and announcing systems, are not within the province of the projectionist.

(To Be Continued)



Robbins & Myers

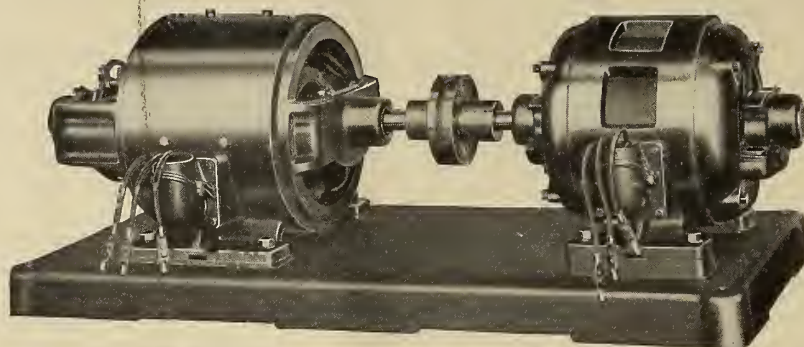
Motor-Generator Sets

For

The Motion Picture Projectionist

Robbins & Myers two-unit motor-generator sets are making a name for themselves in the Motion Picture Industry, and are becoming very popular with The Motion Picture Projectionist.

Many theatres have already been equipped with these two-unit sets. Others are now being equipped. If you are in the market, write for full particulars.



Motor Generator Set: Motor Frame 625, 5 H.p., 1750 R.P.M. 60-cycle, 3-phase;
Generator Frame 126, 3 K.W., 80 volts.

Robbins & Myers motor-generator sets are **DEPENDABLE**, and dependability is what you need for guaranteeing entertainment, nightly, to thousands of "Theatre-goers."

Backed by thirty years' motor and motor-generator experience you can't go wrong in selecting R & M equipment for your theatre. Let us tell you more about R & M products.

THE ROBBINS & MYERS COMPANY

Springfield, Ohio

Brantford, Ontario

Agencies in all principal cities of the World

The New Model M Simplex

By P. A. McGUIRE

International Projector Corporation

THE New Simplex Stand represents a radical advance in motion picture projector design and unquestionably meets many of the requirements created by the present demand for better projection. The New Simplex Stand, which is the work of Mr. Augusto Dina, Chief Engineer of the International Projector Corporation, is amply covered by patents. At one time, progress in the Technical Department of the motion picture industry was greatly hampered by ignorance and indifference, but with a greater realization of the importance of projection has come a willingness to take an interest in this subject and to pay for worthwhile improvements.

The introduction of the High Intensity Lamp some years ago gave a great impetus to the movement for better projection, and there has been a noticeable improvement of projection illuminants. The development of the High Intensity Lamp, however, brought new problems to the projectionist, and one of the most serious of these was the unsteadiness caused by the weight of the lamp and its manipulation. The elaboration of projection presentation through the use of Movietone, Vitaphone and other notable projection novelties with special equipment now being placed on projectors are subjecting them to demands and strains which could not very well have been anticipated in the original design.

Rigidity and Balance Assured

Attempts to overcome unsteadiness resulting from this additional equipment were at best mere makeshifts, and weight and bulk were largely depended upon to maintain balance. The Simplex Pedestal as originally designed, and the five point pedestal which was later used, served for a period, but even these proved inadequate. Various braces were manufactured and used, but such devices have their limitations. While it is true that the defects of the earlier designs were partially overcome by these substitutes, they were unsatisfactory because they failed to supply true balance and rigidity. Modern requirements demand that the projector shall have rigidity and balance, and these have been fully secured in the New Simplex Stand *solely through design*, based upon mechanical principles, and without the aid of supplementary devices.

Unsteadiness Eliminated

The four main assemblies of the New Model M Simplex Stand—the Pedestal,

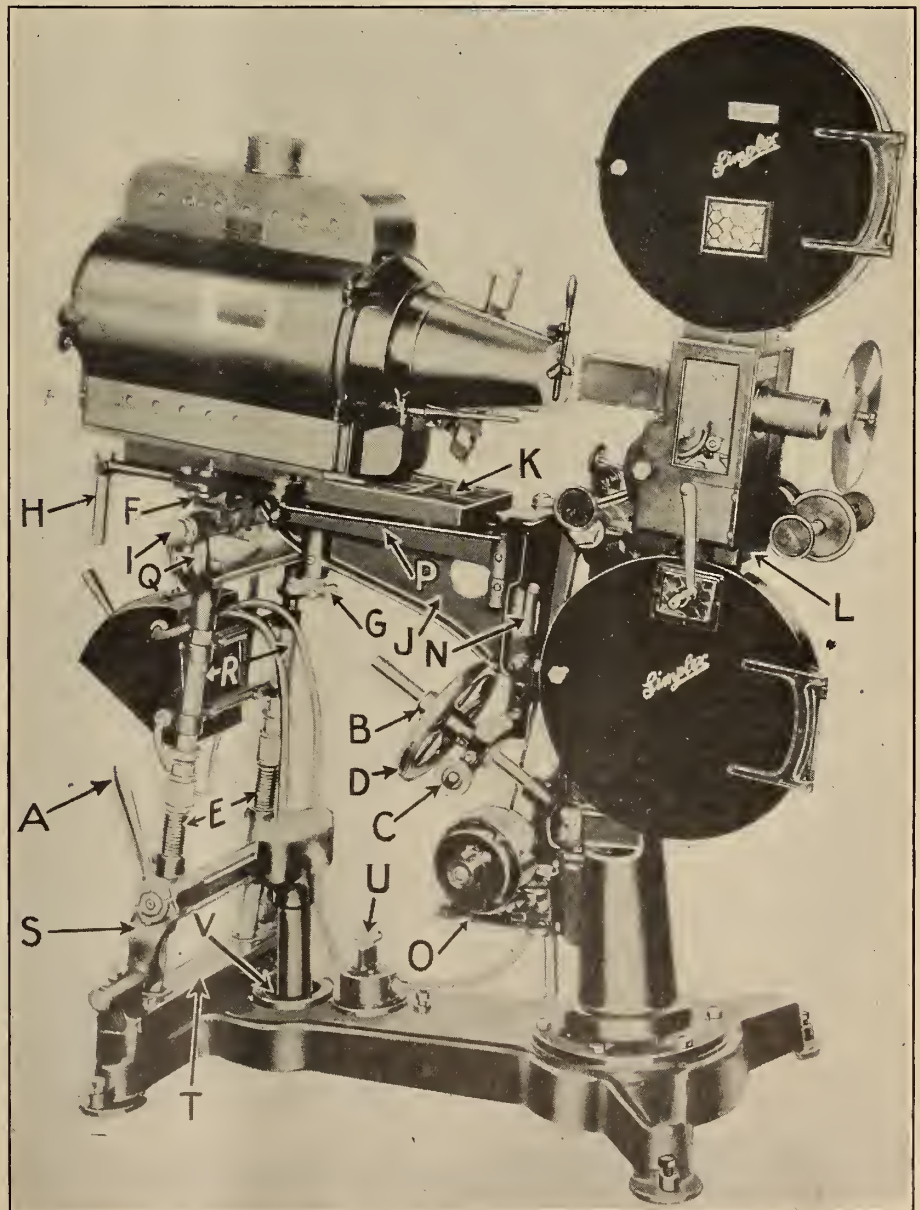
Carriage, Adjustable Support and Base—constitute a single symmetrical unit, with ample weight so distributed that all possibility of unsteadiness is eliminated. The stand rests on six leveling points and the Projector is not attached to the floor or fastened to the building in any way; but proper distribution of weight makes it impossible to disturb the balance of the Projector by any ordinary means.

All parts of the New Model M Simplex Stand are larger and heavier than in former models and the pedestal or column is of a very sturdy construction. The pedes-

tal arm (L) extends under the full width of the mechanism, not part way as heretofore, and the mechanism is held by four screws in place of two. This provides a very substantial table and the pedestal arm swings easily but is firmly held by a 1¼" steel bolt.

The Underslung Motor Table (O) is close to the base and the motor is readily accessible for oiling or regulating. It can be raised or lowered on its supporting rod by merely loosening two heavy wing screws. The position of the motor on the

(Continued on page 34)



The New Model M Simplex

President Canavan Announces Retirement

AT the forthcoming Twenty-ninth Convention of the I.A.T.S.E. at Detroit, President Canavan will formally announce to the assembled delegates his decision that he will not be a candidate to succeed himself nor will he seek or accept any other office in the Alliance.

In the Official Bulletin of the Alliance, published at the organization's office under date of May 1st, there appeared simply a direct statement substantially the same as the foregoing, and it was through this medium that the membership of the Alliance was acquainted with President Canavan's decision in the matter.

Immediately the news of President Canavan's intention to retire at the end of his present term became known the Alliance headquarters in New York was flooded with messages from all over this country and Canada—official messages of Local Unions as well as those of individuals—requesting that he reconsider his decision and agree to remain as International President for at least one more term.

Locals Insist He Stay

Typical of the many such messages received by President Canavan is the following from Local 171, Pittsburgh, Penn.:

May 5, 1928

Mr. William F. Canavan,
International President,
1440 Broadway, New York, N. Y.

Dear Sir and Brother:—

It is with sincere regret that the members of Local Union 171 have learned of your decision to retire from the Presidency of our International Alliance at the close of your official term.

Your administration of our affairs has been characterized by an unswerving devotion to the ideals and principles of organized Labor.

Our International Alliance loses its greatest executive head and we, of the rank and file, lose a friend whose integrity and fairness have never been questioned.

Local Union 171 asks you to reconsider your decision and for the good of our International Alliance to again accept the nomination for its highest office.

With our sincere good wishes,

Faternally Yours,

(Signed) JAMES A. SIPE,
President

A. L. CRISWELL,
Secretary

President Canavan is, of course, deeply sensible to the many fine tributes to his ability as a leader and a friend, and the chances are that, if he could possibly see his way clear to accede to the wishes of his host of

admirers that he stay as their leader he would. Circumstances are such, however, that he cannot with justice to himself put aside his determination not to again be a candidate for President.

Fine Record

It is common knowledge that when President Canavan first entered upon his duties as head of the Alliance, the task confronting him was enormous. Immediately he assumed his new office he set about making such changes as he thought necessary, reorganizing the machinery of the Alliance to its present high efficiency and instilling in the whole organization the spirit and morale which today characterize it as one of the strongest Labor bodies in America. The task required the utmost in leadership and painstaking care. Both of these qualities predominated in the make-up of the International President. But the work took its toll.

Retirement Definite

Now with the work he set out to do completed, with the International Alliance functioning in such splendid fashion, President Canavan feels that his task is done. He may retire from office with a record of accomplish-

ment unmatched in the history of the Alliance.

It is extremely doubtful that President Canavan will permit his name to be placed in nomination for the Presidency before the Convention, and it is not unlikely that if the delegates insist on naming him President he will decline to serve. The possibility of this latter action is not at all remote, for it is understood that in certain sections there is a movement on foot to do just this. Speaking to a representative of THE MOTION PICTURE PROJECTIONIST at his office in New York recently, President Canavan stated with finality that he was committed to his plan not to again be a candidate and reiterated his decision not to serve again, irrespective of circumstances.

Before becoming an officer of the Alliance, President Canavan was Business Representative of St. Louis Local Union 143 for 13 years. He was elected Vice-President of the Alliance on July 13, 1913, a post which he held until he was called to assume the Presidency on October 30, 1923. He was regularly elected President at the Cincinnati Convention in 1924, and was re-elected at the Cleveland Convention in 1926 for the term of office which he is now completing.

Letters From Readers

EDITOR OF THE PROJECTIONIST:

Sir:—A few projectionists and myself—all members of Local 306—have been trying to stop the practice of marking the ends of reels with punch holes or scratch marks and using these marks as cues to fade from one reel to another. However, I have been thinking that our efforts in this direction are of a necessity limited, and the proper way to proceed seems to be to enlist your aid. The punch-hole artist is a disgrace to the craft, and anything you may be able to do to mitigate the evil these men do will be a service for every projectionist everywhere.—DAVID MEYERSON, Brooklyn, N. Y.

EDITOR OF THE PROJECTIONIST:

Sir:—I think the following deserving of attention by the readers of your magazine. I wonder how many men have been annoyed, as I have been, by negative patches, or, rather, the result of poorly made negative patches that make themselves prominent in the positive prints received for projection?

It seems that when these negative patches were made more emulsion had

been scraped off than had been covered up when the pieces of film were welded together. Consequently, when these pictures are projected there appears on the screen a white horizontal line, which is exceedingly bothersome and keeps one jiggling the frame lever up and down trying to mask it out.

I presume that these patches are made by machines which have been carelessly adjusted. The matter may seem of little import, but in a picture which has a goodly portion of close-ups and quick changes of scenes this white line is very annoying and makes for anything but good projection.—THOMAS McNAMARA, Waltham, Mass.

EDITOR OF THE PROJECTIONIST:

Sir:—Your paper is the most wonderful magazine on projection I have ever read. It is a paper that is both educational and entertaining. You may be sure that I shall recommend this magazine to all of my fellow craftsmen. Keep up the good work.—JOHN STROBEL, Ludcke Theatre, St. Paul, Minn.

Movietone Tubes

(Concluded)

Tubes are seldom a source of difficulty. Their life will, of course, depend very largely on the extent to which the equipment is used daily. The life of a vacuum tube is seriously reduced if the filament current is too high; the reason for this is that an overheated filament throws off electrons at an excessive rate and the oxide coating, which supplies most of the electrons, therefore becomes rapidly exhausted. When a filament is near the end of its life, a weak spot usually develops which glows more brightly than the remainder. Whenever a tube begins to show this symptom it should be replaced by a fresh tube from the spare stock. If the filament current is too low the tube will not be harmed but the system will not deliver proper volume and the quality may be impaired. Therefore, always regulate the filament current carefully to the value specified in the operating instructions.

Noisy tubes are occasionally encountered; this is due to irregularities in the rate of emission of electrons by the filament. Such tubes will rarely give trouble unless they are in the first stage of the amplifier, where the high sensitivity makes a quiet tube essential. If noises are heard from the horns with the fader at zero, there may be reason to suspect a noisy tube, and the first stage tube of the first amplifier should be interchanged with one of the other tubes or with a spare, to see if this clears up the condition.

With amplifiers deriving any of their power supply from storage batteries, it is a very important matter to always keep the batteries in first-class condition. Loose connections, or accumulations of acid or dirt on top of the battery, are capable of causing fluctuations in the current which it delivers to the amplifier. These fluctuations are amplified and reproduced by the loud speakers in just the same way as the fluctuations repeating speech or music picked up from the reproducer, and are responsible for disagreeable frying and crackling sounds. Battery noise may also occur if the batteries are used soon after charging, while they are still gassing.

As has been mentioned previously, it is very important for the proper operation of the amplifier that the "C" voltage which keeps the grid negative should be maintained at the correct value. In the case of amplifiers where this voltage is furnished

I WONDER IF THE TIME WILL COME—

When film exchanges will thoroughly inspect and repair every reel of film they ship out to theatres?

When inspectors will take time and patch their films in frame?

When exchanges will not expect their film inspectors to repair and inspect 40 to 50 reels a day?

When they will stop shipping film on reels that it is impossible to use on a projector?

When they will send out accurate cue sheets with each feature?

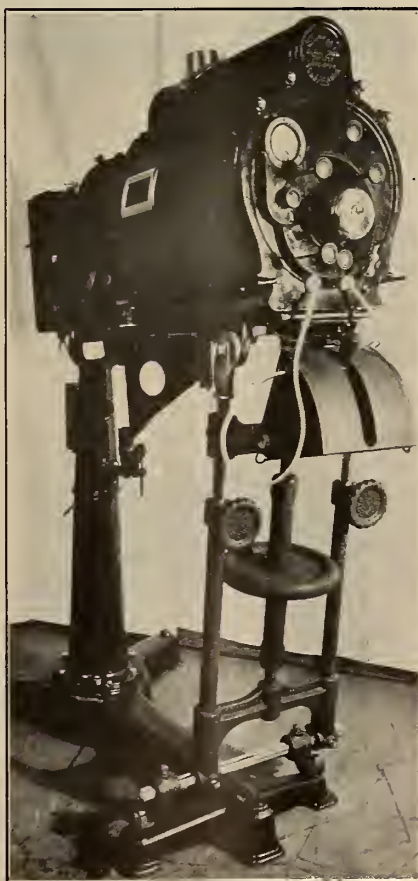
When the projectionists will ever come to understanding that the film is only loaned to them and a brother projectionist may have to use it before it is returned to the exchange for inspection?

When projectionists—a few only, thank goodness—will take the time to scrape the emulsion from titles and trailers when splicing them back on the films after making 1,000-footers into 2,000-footers?

When projectionists will realize that two or three drops of oil is plenty to put in each bearing of a projector and not drown the projector in oil?—W. T.

by small pocket flashlight dry batteries inserted in battery boxes on the front of the amplifier, periodic inspection is desirable to insure that the voltage is not below a satisfactory value.

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Complaint Department

EDITOR OF THE PROJECTIONIST:

Sir:—I would appreciate your affording me an opportunity to say a few words regarding the shipment of a certain make of reflector lamp to this part of the country. Invariably when these lamps are shipped out here they have a date and paper seal stamped on the back or rough side of the mirror. After the mirror is used about a week this lamp comes through and shows the exact size and shape of the seal and the date, thus giving the shiny surface a brown cast which deadens the reflection of the mirror and causes a slight coating of brown on the screen. I wish you would help us out in this matter, as the practice is very annoying, in addition, I am sure, to causing this particular manufacturer considerable loss of prestige out here.—JESS TUCKNESS, Secretary Local 447, Springfield, Missouri.

EDITOR OF THE PROJECTIONIST:

Sir:—One would think that by this time the practice of using metal clips as splicers on film would be a thing of the past. Yet only the other day a first-run news from one of the "leading" exchanges out here came through with such a clip on it. With all their great claims to careful inspection and with the urge to attribute to the projectionist all blame for any damage to film in the projection room of a theatre, the exchanges persist in sending out film of this sort. It goes without saying that even the most cursory inspection of this particular bit of film would have revealed this metal clip which, if allowed to run through a projector, would have caused considerable damage not only to the film but to the mechanism. As a matter of fact, it would not have run through the projector. This is the sort of stuff we projectionists have to contend with daily, despite the vaunted efficiency of the exchanges.—H. SPARGO, New York City.

The President of Local 306

NOW that every one admits that "talking pictures" have come to stay and that they will practically revolutionize the conditions under which the projectionist craft has been working, it is interesting to recall that Sam Kaplan of Local 306 was the first to see the possibilities of these devices and to lay his plans accordingly.

When Vitaphone first made its appearance, almost everybody in and out of the motion picture business looked upon it as a passing fad that would strut its brief hour upon the stage and then proceed to fold up and vanish. But Kaplan thought otherwise. He made a thorough study of the "talking motion picture" situation, familiarized himself completely with the workings of the various systems, visualized the real possibilities of the introduction of the various devices and at once moved to insure the establishment of the best possible working conditions for the projectionist.

His reputation for always being on the alert to improve conditions for projectionists everywhere, attested to by his sponsorship of some of the most important improvements within the craft in the last few years, was enhanced considerably by his skillful handling of the "talking picture" situation.

There were not a few experienced showmen who thought the President of Local 306 was wrong, a statement borne out by the slowness with which certain produc-

Know Your Craft

Projectionists everywhere should know their craft, its aims, its accomplishments, its outlook—and, last, but not least, its leaders who have so much to do with the formulating of policies for the entire craft. This is the first of a series of sketches of leaders in projectionist ranks throughout this country and Canada. Next month—Tom Malloy of Chicago.



Sam Kaplan

ing units moved to avail themselves of a device. Even astute theatre managers along Broadway scoffed at Kaplan's idea that in another year or so they would all be sitting in conference arranging for the installation of talking devices in their theatres. . . . And that day has now come to pass. Very few theatres along Broadway are not so equipped, but the circle of theatres contracting for these devices is widening daily.

This far-sightedness is one of the most prominent of Kaplan's qualities. He has been able to see far into the future, lay plans accordingly and extend innumerable benefits to his Local. He is particularly fortunate in having a very capable and efficient administrative family, all working in the finest harmony and achieving one goal after another.

It has often been said of Kaplan that his remarkable success as President of Local 306 is due not only to his own abilities as a leader but to his faculty for associating with him as brother officers just the right type of men—men who may be intrusted with any and all tasks with full assurance that they will carry them through successfully. The record of the Kaplan official family would seem to indicate that this surmise is correct.

The champion of Organized Labor within and without the projectionist craft, Sam Kaplan has compiled a brilliant record as leader of the largest projectionist Union in the country.

The Manhattan Projection Society

By SIMON TERR

THE formation of The Manhattan Projectionist Society was the logical outgrowth of the need of the more than 1,200 members of Local 306, of a forum wherein they would find assistance and advice tending to better themselves in their craft.

A little over a year ago I became imbued with the idea of launching just such an organization that would have for its purposes matters purely educational; and the result was the formation of the Manhattan Projection Society. When I use the term "purely educational" I do not mean to imply that the organization does not and will not indulge in any social activities; such is not the case. But the main purpose of the Society is educational, and whatever other activities it may promote are assuredly of secondary import.

At other times during the year, such as when there arises some question soliciting the careful attention of the Local membership, the Society holds a meeting in the nature of an open forum to which the entire membership of the Local is invited.

With the Society having been in existence only a year there are now more than 200 names on its rolls. The requirements for admission into the Society are few; yet these few are rigidly enforced by the offi-

cers of the Society. The first requirement is that the candidate be a union man and a projectionist; second, that he be known to the officers of the Society as a progressive



Simon Terr

projectionist, that is, one who is anxious to aid and be aided. And while there is no unfair discrimination practiced in the admission of candidates, there is an unwritten tenet of the Society that the candidate must observe all the rules of good form at all times, whether while attending a meeting or without.

The proceedings of the meetings of the Society are, as has been noted above, concerned with educational matters, but the officers feel that the Society is unusual in the respect that, while the mechanical phase of projection is given much attention, there are also discussions relative to the general knowledge a projectionist should have, i. e., relations with his employer, with his brother craftsmen, with those of other crafts, and his conduct and attitude in general.

Membership in the Society does not entail any great financial straining on the part of the individual member, the cost per year of a member being \$6.00; new applicants are required to pay a \$2.00 Charter Fee.

As a valuable adjunct to the progress of the craft, as a splendid extension of the work of any Local, I recommend societies of a nature such as the Manhattan Projection Society. Their power for good is unlimited.

EXPERIENCED PUBLISHERS ARE SAYING

"The Growth of The Motion Picture Projectionist is amazing. It can be accounted for only by the fact that it is an extremely capable paper carrying the most vital information to a great craft which hitherto had no paper at all. It is drawing attention to a highly skilled section of the industry and is being rewarded by an avalanche of subscriptions and the business of a constantly growing list of advertisers."

FIGURES THAT TALK VOLUMES

85%

of all the projectionist Locals of the I. A. have sent in subscriptions. They started to send them in soon after the first issue was out in October and they are still sending them in at the rate of 25 to 50 a day. Projectionists have taken this magazine to their hearts.

28%

of all the Locals have sent in subscriptions covering their membership 100%. This is a remarkable tribute to their own craft paper. It signalizes their desperate need for one and thus they have embraced this paper enthusiastically.

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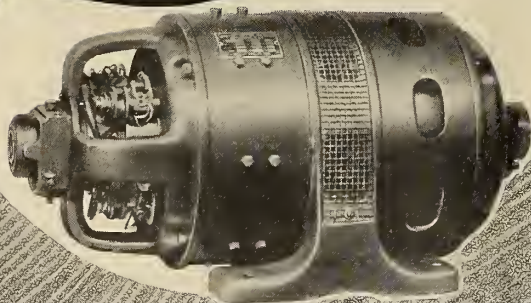
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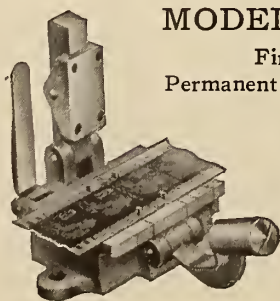
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Projection and Visual Defects

By DAVID LEVINSON

THE projectionist, with his knowledge of optics, should readily realize the detrimental possibilities of visual defects. Yet, it is perhaps fair to say that an overwhelming percentage of motion picture projectionists pay small attention to their eyes and allow their work and physical system to suffer, as a consequence of ocular negligence.

"Ounce of Prevention"

With the necessity for the almost constant application of artificial light, and called upon for intense visual concentration, the projectionist subjects his eyes to direct abuse that has few equals. Extreme sensitiveness, with very evident effects, is the price frequently paid by the guilty projectionist who does not take it upon himself to use in his work some sort of a lens, even if crudely mounted, to dispense with glare and the harmful results of the strong elements he contends with for hours at a time. Personally, I can think of no other "ounce of prevention" that is of more potent and practical significance for the projectionist.

In the instances where a projectionist possesses an error of refraction—*hyperopia* (far-sightedness), *myopia* (near sightedness), or *astigmatism* (unequal refraction), or combinations of *astigmatism* and either *hyperopia* or *myopia* or both—there is present a positive and definite diminution of efficiency, due to the projectionist's inability to see properly, insofar as distance is concerned, and to see well, insofar as quality of vision is related.

Serious Disadvantages

To go deeply into this phase of the subject would just about necessitate a general discussion of visual errors. However, the reader, assumed to be sufficiently well acquainted with lenses, can easily realize what it means to a *myopic* (near-sighted) projectionist to work without glasses, when his error, physically and mechanically, signifies that he is robbed of a great deal of "minus" power, which must be compensated for by wearing a lens that has the power of divergence. The effect in the hyperopic (far-sighted) subject is just the opposite, while the astigmatic projectionist is perhaps the most unfortunate of all, for he fails to grasp pictures in correct positions, and, even, in correct proportions, depending upon the seriousness of the refractive error.

While, as stated in the opening

paragraph of this article, the wages of negligence on the part of the projectionist are most often sensitive and uncomfortable eyes, the appearance of this pathology is so readily discernible that correction is more likely to be sought for than in the case of refractive errors. In the case of a refractive error, the projectionist is prone to go on for years without attention to his trouble. Having contended with the error for a long time, the projectionist sizes things up as they appear to him, as standard. Then, suggested changes are naturally revolutionary to him. Unless forced to alter his procedure, the routine methods are kept in force. This, then, only means a continuation of poor projection through ignorance of the real facts.

Regular Examination Urged

What steps have been taken to inaugurate the plan I am about to suggest, I do not know. It is, however, my sincere belief that, beginning with the projectionist now employed, every projectionist should be made to have his eyes examined and his visual errors corrected. The process should be attended with very little difficulty and I venture to state that most any group of specialists who make a practice of examining eyes will be glad to co-operate with projectionists and render the examination service at a very reasonable cost.

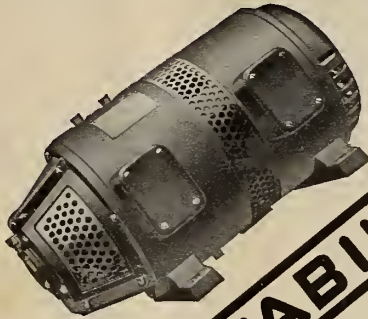
Correct Answers

More than 50 answers were received to the group of ten questions which appeared in the February issue. The time limit originally set for the receipt of answers was extended so that the far Western and Canadian readers might have a chance to submit their answers.

Those who succeeded in answering all ten questions correctly are: J. W. Carpenter, Austin, Texas; George Raaf-laub, Syracuse, N. Y.; D. Goldsmith, Brooklyn, N. Y.; Thomas A. Fischer, New York City; R. J. Sherman, Aberdeen, S. D.; Johnny Pross, New York City; Claude McAdams, Amarillo, Texas, and Jack Rosen, Boston, Mass.

Of the above answers, the palm for the best set must go to Thomas Fischer of New York, who not only answered the series correctly but elaborated on each item in such a way as to make his contribution outstanding.

With becoming modesty, however, Mr. Fischer confided that the answers were not at the tip of his tongue but were secured only after he had waded through several reference works and dusted away the mental cobwebs which had formed about the subjects.



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Rise of the Alliance

(Continued from page 7)

In 1901 the Convention met in Malones Hall, Toledo, and elected Charles H. Bohn, President. More Locals were present than the year previous. Their numbers in that year ran consecutively from 1 to 87.

The Tenth Annual Convention met in Emerald Hall, Norfolk, Va. Bohn was re-elected for a second term. Strikes had occurred here and there in the Locals' fight for better conditions and the aid of the I. A. was now solicited generally, the Locals having recognized that its aid was useful and necessary.

"International" Adopted

It was here that the name of the Alliance was finally changed from National to International.

With the Conventions held each year,



Frank R. Day,
Recording Secretary, Local 306

they succeeded each other rapidly, the scene changing from city to city. In 1903 the Convention was held in Schenk's Hall, Columbus. P. T. Barry, of Boston, was elected president for the following year. In 1904 it was held in Academy Theatre Hall in Milwaukee, and P. T. Barry was re-elected for another term. In 1905 the Convention was held in the Duquesne Garden Amphitheatre in Pittsburgh and the chief executive job went to John Suarez of St. Louis. In 1906 it was held in Boston again in Berkley Hall. Suarez was re-elected. In 1907 the Convention was held in Armory and Eagle's Hall in Norfolk, Va. Again Suarez was re-elected.

Organization Endangered

In 1908 the Convention was held in Minneapolis. John J. Barry of Boston became President. In 1909 it was held in Springfield, Ohio, and John J. Barry was re-elected. In 1910 it was held in Washington, D. C. Barry was again re-elected.

In 1911 it was held in Niagara Falls. Charles C. Shay was elected President. This was the nineteenth Convention.

Shay was re-elected the following year

(1912) in Peoria, Illinois, and re-elected for the third time in Seattle, in 1913. At this Convention it was decided to have the term of officers two years instead of one and to hold the Conventions every two years instead of annually.

Canavan's First Office

It was at the Seattle Convention in 1913 that William F. Canavan made his first appearance in the I. A. administrative family as Third International Vice-President. With Shay and the other officials he held office until 1915 when the Convention assembled in Chicago. Shay was once more re-elected President and Canavan was re-elected to the Third Vice-Presidency.

At the 1913 Seattle Convention, the Operators came officially into general recognition and hereafter the title of the International became International Alliance of Theatrical Stage Employees and Moving Picture Machine Operators of the United States and Canada.

In 1917 the Convention assembled in Cleveland. Again Shay was re-elected for another two-year term, and Canavan moved up to the second vice-presidency.

Sam Kaplan made his first appearance as a delegate at this convention. This year he comes to Detroit at the head of the Local 306 delegation, representing one of the most powerful Locals in the Alliance.

In looking over the report of the combined Convention proceedings one notes at once how numerous and varied the problems of the International had become by this time. Hundreds of Delegates were now in attendance at each convention and the problems of individuals and of Locals were thrashed out in committee rooms and on the floor. The I. A. by this time was considered as one of the important sections of the American Federation of Labor and it enjoyed great prestige in the national labor movement because of the splendid way it had organized its craft.

In Ottawa, Canada, in 1919, the delegates re-elected Shay, president, for another two-year term. Canavan moved up to the First Vice-Presidency. James Lemke became manager of the Organizing and Claim Department.

At this Convention it was determined to hold the Conventions again annually instead of biannually. This was deemed necessary because of the tremendous amount of new business demanding attention every year.

So in 1920, the following year, we see Delegates again assembled in Convention in Cleveland. The International now had a total of 437 Local Unions and these had sent 557 delegates.

James Lemke was elected President for the following two years. Canavan remained in the First Vice-Presidency.

Shay Re-elected

It will be remembered that in 1919 Shay was re-elected for two years. When the delegates met again in 1920 Shay resigned, pleading ill health. Lemke was then elected to serve a two-year term as President, from 1920 to 1922.

The next Convention was held in 1922 in Cincinnati. Shay was once more chosen

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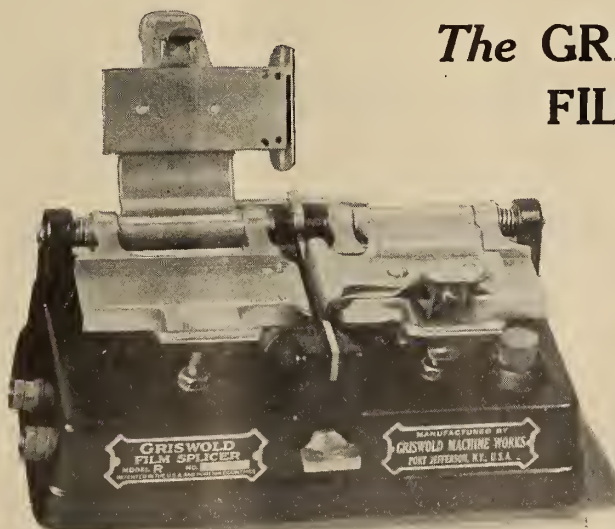
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President for another two-year term, that is, until 1924. Canavan remained as First Vice-President. At the 1920 Convention Shay had been made President Emeritus and had been presented with a gift of \$10,000. The delegates cheered for five minutes when the presentation was made. "There were calls of 'Charlie Shay' from all over the hall," says the Convention Report. "Delegate Goldfarb of Local 306, New York, called for three cheers and these were given with a will."

Let us recall here that Charles Shay held the post of President for 10 years, from 1912 to 1920 and from 1922 to 1923.

Canavan Named President

Thursday, May 22, 1924, was a red letter day for the International Alliance. On that day, again in Cincinnati, the International elected William F. Canavan, President. His administration, unbroken since that time, has made the International more powerful, wealthier, and its far-flung international membership happier than ever before.

Now, Canavan had already held the post of Chief Executive in the interval between the time Shay suddenly relinquished his post in the middle of his term up to the time the Convention met in 1924. As is well known, Canavan was elected President for the full term for the following two years at this 1924 Convention.

The twenty-eighth Convention was held in 1926 in Cleveland. Canavan was re-elected until 1928. Five hundred and eighty Local unions sent 700 delegates.

And Now—

And, on June 4th, the International Alliance meets in Moose Temple, Detroit, for its 29th Convention. It will be the biggest in the I.A. annals. Much good surely, will grow out of it.

New Local 306 Society

Another educational society within Local 306 came into being on May 18th last, when the first meeting of the Kaplan Projection Society was held. James LeFante, Brooklyn and Queens Business Agent of Local 306, is the organizer and prime mover in the formation of this new Society.

At the first meeting the general plan of the Society was outlined to a large and enthusiastic gathering, and many members were placed on the rolls. LeFante was named President of the new organization.

The Kaplan Projection Society proposes to do for the Brooklyn membership of Local 306 what the Manhattan Projection Society has done for its Manhattan members. All meetings will be in the nature of an open forum in which discussion of any and all problems pertaining to the welfare of the projectionist will be invited. At other times, such as when a manufacturer is about to bring out a new, or improved, product, the entire Local 306 membership will be invited to attend the meeting.

After the regular business session of the first meeting, Johnny Pross, projector expert, addressed the gathering. He gave an excellent talk on projector parts, troubles, etc., and answered any and all questions on the subject.

Meetings of the Society will be held twice a month.

Steady Projection

(Continued from page 8)

wheel is turned, thus precluding any chance of a tip-back or the necessity for another person "to hold up one end of the projector" during this operation.

At this point it seems in order to direct attention to the method provided for locking the tilting mechanism and to the type of design which provides that when the tilting device is locked by means of the hexagon nut and clamp plate shown to the left of Figure 4, the two units comprising the lower magazine and lamphouse support and the floor base, become essentially one solid rigid unit. The construction of the tilting segment is such that at all positions of tilt the clamp plate makes a secure

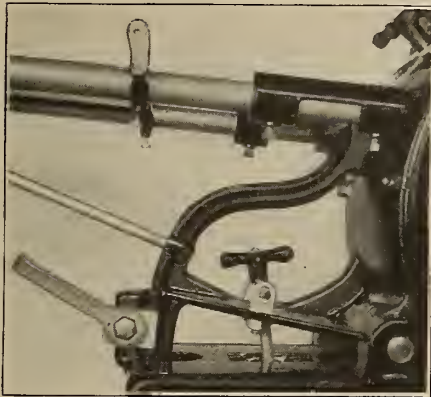


Fig. 4

contact with it, and on the opposite side, directly back of the clamp plate, are two hexagon head-set screws also bearing against the segment.

Recent Improvement

An illustration of a modern improvement in tilting mechanisms for projectors is Figure 5, which shows what is called a Rapid Tilting Device. This device is an elaboration of the regularly furnished standard tilting device pictured in Figure 4, in that the hand wheel is replaced by gearing operating on ball bearings and an extended shaft and large balanced hand wheel which permit a very rapid and smooth tilting of the projector

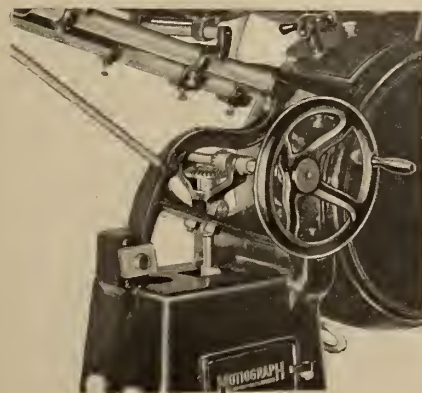


Fig. 5

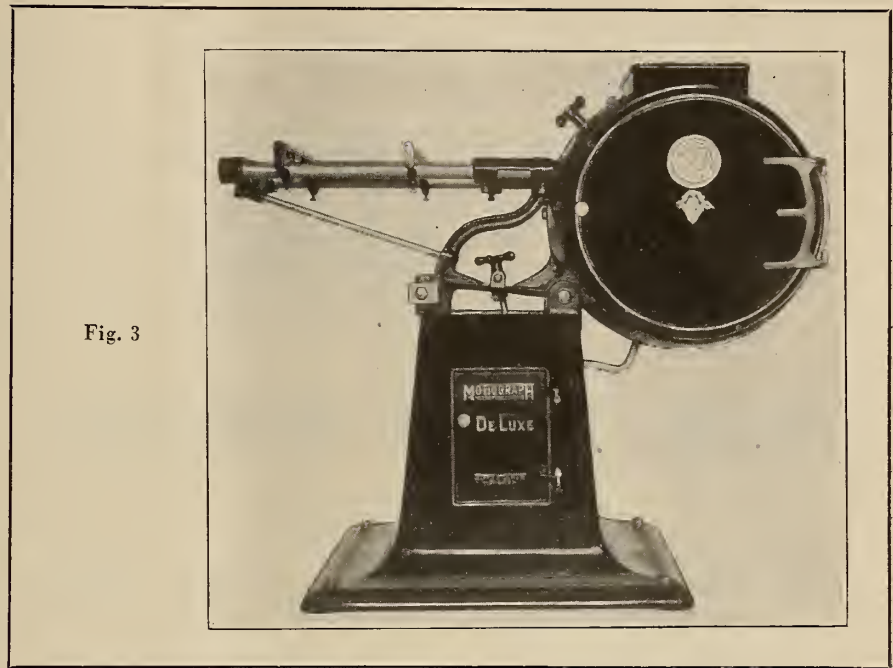


Fig. 3

Comment on April Contents

EDITOR OF THE PROJECTIONIST:

Sir: Us "cullud" folks must stick together, so I wish to comment on Irving Green's signal system which appeared in your April issue. Your book arrived only ten minutes ago, but I hasten to tell you that Mr. Green's system is far and away the best I ever saw or heard of. A lot of serious thought went into that simple diagram.

I would like to suggest, however, that in making up the system, projectionists use snap switches and not knife switches. Mr. Green does not specify either kind, but if snap switches are used, the possibility of the stage switch being left in an open position is automatically precluded.

Furthermore, it would be advisable to use two lamps in multiple where each one is indicated in the diagram, and for the same feature—reliability. If one lamp breaks or burns out, the other still is on duty, and the one lamp burning alone is a warning to replace the other. It is un-

likely that both lamps would let go at once. while projection is in process. Stop limit lock nuts are provided on the screw shaft of the device and permit of tilting to predetermined limits either up or down.

Combination House Requirements

This Rapid Tilting Device was developed to answer the requirements of combination vaudeville and picture theatres, where it is desirable to start the picture presentation on a screen "in one" and change to a screen backstage. In most theatres of this type, the projection angle is considerable and the projectors must be tilted to register on both screens. When this device is used, the hexagon clamping nut is replaced with a hand clamping wheel.

likely that both lamps would let go at once.

One more point: Bridge the vibrator contacts on one buzzer, since they are in series. If they are worked on A. C., bridge both and adjust the tension until they vibrate in frequency with the alternations. This is admittedly quite a bit of work, but makes a very reliable installation.

Congratulations to Mr. Green—the other one.—CHAUNCEY L. GREENE, 3141 Harriet Ave., Minneapolis, Minn.

EDITOR OF THE PROJECTIONIST:

Sir:—In looking over the wiring diagrams and article as submitted by Wesley Trout on page 26 of your April issue, I wish to call your attention to the following observations:

After checking up on the diagrams in which he refers to a hookup of two rheostats in multiple, together with a rectifier (which is, I presume, intended for a breakdown or emergency service), I find that while the rectifier will function, the rheostats will be out of the picture. In other words, they will be dead.

As the diagram now stands, there is no complete circuit through the rheostats, and if the jumper on the 4-pole, double-throw switch is to signify a continuation of a line through the rheostats, then the latter would not be in multiple.

I also wish to take exception to the paragraph where the writer states, "This diagrams shows how to wire a rectifier and an A. C. compensarc on an 8-pole switch." I assume that he meant to say a 4-pole, double-throw switch. Perhaps other projectionists came to the same conclusions with regard to these diagrams —DAVE NARCEY, Local 306, New York.

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Motor Tips

By JOHN T. SAUERBORN

THE causes of fuse blowing on a polyphase, squirrel-cage, induction motor are as follows:

- 1—Overload on motor.
- 2—Throwing starting switch of compensator from *starting* to *running* position too quickly.
- 3—Throwing starting switch of compensator to *running* side without touching the *starting* position. (This can be accomplished by holding up the small lever on handle side of starting compensator.)
- 4—Motor becoming grounded.
- 5—Starting switch being in *running* position when service comes back on line after interruption.
- 6—Excessive current due to low voltage or short circuits in stator windings.
- 7—Loose connections on fuse block, causing high resistance.
- 8—Fuses too light for amperage per phase.

There is a possibility of more serious trouble if the fuses do not blow and the motor, humming loudly, comes to a standstill. Under this condition the current will be greater than normal, so that the heating effect being increased as the square of the current, causes the machine to burn out its insulation.

Lowered Voltage

As the torque or turning power of an induction motor is proportional to the square of the applied voltage, it is evident that lowering the voltage will affect the ability of the motor to carry load and may cause it to stop. Or the bearings may have become worn so that the air gap has been reduced on the lower side of the rotor, allowing the motor to rub on the stator, thus causing such a degree of friction that it will be more than the motor can carry; then the motor will shut down.

Bearings introducing excessive friction may be caused by dirt in oil, the oil rings not turning, or by the improper alignment of the motor.

Filmite and Filmedor

Exclusive world distribution rights to Filmite, the film cleaning fluid, have been acquired by Foster & Bartlett, Inc., with offices at 45 West 45th St., New York City.

This fluid is warranted by the distributors to not only clean film but also to polish it, to restore brittle film and to cure buckling. Foster & Bartlett, Inc., have announced the closing of a contract for a large quantity of Filmite with the U. S. Navy Department, and it is understood that the liquid has been tested and approved by the U. S. Bureau of Standards.

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Noted Penn. Legislator A Former Projectionist

PARTICULAR mention of the political rise of Clayton A. Dietrich, former Business Agent of Local Union 171 of Pittsburgh, Pa., is in order. Mr. Dietrich has already served one term in the Legislature of the State of Pennsylvania and is a candidate to succeed himself at the coming election.

Rival Is Theatre Owner

By a strange coincidence, the Secretary of the Motion Picture Theatre Owners of Western Pennsylvania, Mr. Fred J. Herrington, is a candidate for the Legislature from the same district which Mr. Dietrich now represents. This is the second round of what appears to be a perennial battle between these two gentlemen, Mr. Dietrich

by law. Every person should observe Sunday according to his own convictions, but never under duress of a civil magistrate.

"I am in favor of permitting the theatre to remain open on Sunday, and I believe that baseball and other clean, healthy and enjoyable sports should not be interfered with."

At the last session of the Pennsylvania Legislature Mr. Dietrich sponsored a bill which, had it met with the approval of that body, would have permitted strictly amateur sports between the hours of 2 and 6 o'clock on Sunday afternoon. An unfavorable "Law and Order" Committee did not permit this measure to be reported out of committee.

Members of organized labor throughout western Pennsylvania are watching Mr. Dietrich's campaign for re-election with keen interest.

A. L. CRISWELL

Westchester's Anniversary

The First Anniversary Dinner of Local 650 was held on May 8th at the Farragut Inn, Hastings-on-Hudson. Everybody in Local 650 turned to and did their bit to make the affair a great success. The party attracted a capacity throng, included among which were, in addition to a 100% turnout of Local 650 men, the many friends of the Local from nearby cities. Local 306, New York City, was well represented.

Studio Tinting Device

THROUGH an ingenious device invented by Chief Projectionist W. M. Harris, of the DeMille Studio, it is now possible for directors to see their daily "rushes" in tints, without any delay for the dyeing of film.

Speed Essential

Heretofore it has been necessary for daily "rushes" to be screened in black and white, to save the time required to dye each scene. Speed in delivering prints of the previous day's camera-work is essential, in order that directors may make immediate decisions regarding retakes, the striking of sets, etc. However, the screening of "rushes" in tints is of great value in the selection of "takes," and the deciding of the proper dyes to be used for the finished picture.

The Harris device consists of a series of twenty 5 x 7 Eastman process plates, first fixed out in Hypo, washed, and dipped in various dyes corresponding to the dyes used to tint motion picture film.

High Selective Value

The plates are mounted in frames which swing between the lamphouse and the aperture of the projector, defining the color of the light before it reaches the lens, and thus keeping the picture in sharp focus. Thus it is possible for the director to see the same scene in twenty different tints before deciding which tint he desires for the finished picture.



Clayton A. Dietrich

having won the first round and election to the Legislature at the last election.

In an interview recently with a representative of THE MOTION PICTURE PROJECTIONIST Mr. Dietrich stated: "If I am elected to the office of legislator, I will work for the modification of the pernicious 'Blue Laws' now in force in Pennsylvania."

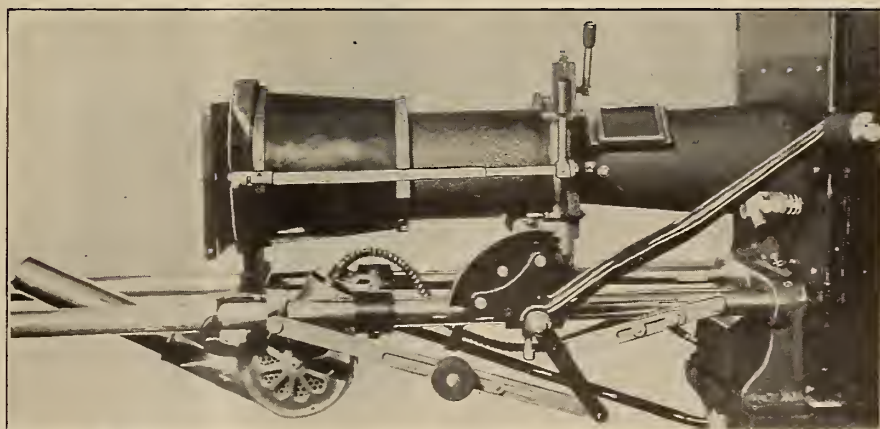
Favors Individual Rights

"The battle for freedom from ecclesiastical interference in civil affairs has yet to be won in Pennsylvania, a State that should be in the forefront ranks of those who are waging the struggle for full freedom of conscience. I believe that an act which is honorable and legitimate on Monday is not less so on the Sabbath."

"What religion favors or forbids as proper or improper conduct on Sunday or on any other day is not for the civil government to determine or attempt to enforce

The New H. & C. Spot Lamp

(Continued from page 13)



Lens Carriage

The image of the positive crater is focused by means of the condensers onto the opening or aperture of the iris, thus brightly illuminating this opening. This brightly illuminated round opening is focused by the objective lens and it is the spot that is seen on the stage. The arc flame, negative image, and color fringe is cut off by the iris and a very clean spot is the result.

Projectionists who have already worked with this new H. & C. product or who have seen it demonstrated, declare it to be far superior to anything of its kind. Anyone wishing more detailed information concerning this particular equipment may secure same by addressing their inquiries either direct to Hall & Connolly, Inc., or to the Service Department of THE MOTION PICTURE PROJECTIONIST.

The Silent Drama Speaks

BY JAMES J. FINN

VITAPHONE . . . Movietone . . . Photophone . . . Vocafilm . . . One skips from one to another of the various "phones," "tones," and "films"—not to mention at least two more "talkies" definitely slated to join the procession within the year—and realizes that with the passing of every day the motion picture is one more step advanced to that time when it will no longer be the silent drama but the "talking motion picture." And with every day it becomes more articulate in a manner more than faintly suggestive of a baby who suddenly finds the power with which to give voice to its emotions.

"Talkies" Here to Stay

"Talking motion pictures," in one form or another, are here to stay. No one ever doubted that from the moment on that hot summer's night more than two years ago when Warner Brothers ushered in their Vitaphone at the Warner Theatre in New York. Then, Vitaphone was a sensation, and justly so. But, seen in the light of later developments, that summer evening's entertainment was but a portend of greater things to come, of new delights to be made possible by the wizardry of science. And last, but by no means least, it signified an upheaval in the motion picture industry which is not less distant simply because its progress has not had the attention of the average fellow.

Just two weeks ago Josef von Sternberg, a P-F-L director whose "Underworld" won the gold medal for the best feature on that company's list last year, left for the Coast with very definite instructions, so it is understood, that in the selection of casts for future productions, the speaking voice of the player must receive equal consideration along with their other abilities.

As to the Players

Recently there was shown on Broadway a picture at the end of which the two leading players were not only seen but heard, the latter being via Vitaphone. The picture critics hailed this innovation with much satisfaction, pointing out the arrival of a "new" motion picture. The stunt itself having hogged their attention, not one of them thought to consider whether the experiment showed the players to have good or bad vocal properties, whether their enunciation, "stage presence," etc. was of a sort to insure their staying in the movies, come what may in the form of "talking picture" devices. The truth of the matter was that the two players in question were not so good in their speaking

parts, and the "talkie" proved it. . . Just another indication of the changing order.

Other Entrants

Added to Vitaphone and Movietone, two systems which may be said to be solidly established in the industry, are Vocafilm, understood to be a device best suited for small theatres, and now Photophone, the

new RCA device, announcement of which was made recently. First National is getting under way with a device which will be operated under Western Electric patents, and Metro and Paramount are regarded as tied up with Electrical Research, subsidiary of Western Electric, to bring out a device which is expected to be helped

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along considerably by the resources of the Victor Talking Machine Company.

Keen Competition

No less than six systems, then, will be on the market before the year is out. With the exception of Movietone, which reproduces sound photographed onto the film itself, all these systems will be synchronous disc arrangements. Several independent "inventors" are also active in the "talkie" field, but their efforts are necessarily restricted and are expected to uncover nothing radically advanced in the development of the talking devices.

Competition among the patentees of the various devices is certain to be keen. What with Western Electric and General Electric lined up on opposing sides, not forgetting several other entrants in the race, and with the two leaders commanding unlimited resources, the fight is sure to be waged intensively.

Of course we all knew and know more than ever today that the "talkie" is here to stay. But the point intended to be brought out here concerns the manner in which the projectionist is to adjust himself to this new problem of his craft, the seriousness with which each projectionist regards this sudden burdening of himself and his craft with new and greater responsibilities, a demand for greater skill than ever before and the chance to advance the welfare of himself and his craft to a point heretofore undreamed of.

Projectionist's Responsibility

The all-important point with regard to "talkies" insofar as the projectionist is concerned is not only these chances for advancement, personal and organization, in every respect but consideration of the responsibility thrust upon each individual man. A projectionist in Iowa writes in to say that he "is very much interested in 'talkies'" but supposes he "will have plenty of time in which to get acquainted with the different outfits before they get out to this 'burg'." But not so very long.

On Broadway today the following houses have "talkie" equipment; Roxy (equipped for both Movietone and Vitaphone); Warner, Times Square, Globe and Gaiety; and all the others would gladly install "talkie" equipment if it were available. So soon as First National, Metro and Paramount are ready to "shoot" on the sound reproduction devices, Broadway will be 100 per cent "talkie."

High-Gear Distribution

Present-day commercial methods are such that a theatre in Iowa without a "talkie" today is not necessarily several years—or, for that matter, months—removed from installing a device. Recently the writer visited the offices of a sponsor of a "talking motion picture" device. In one of the offices hung a map decorated with many small push-pins, each denoting the installation of a device. Although the

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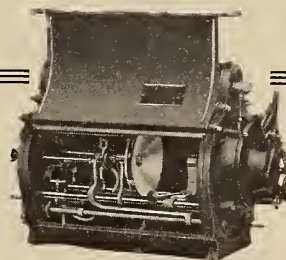
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East showed a preponderance of installations, the line of pins extended far out to the West Coast, taking in many points on the way. And all this progress required less than three years. In three years more . . . what?

More Information Needed

The time factor in the dissemination of information on the "how" and "why" of talking devices is, therefore, of the utmost importance. It is not at all unlikely that in many theatres today there is operating a device concerning which the attendant projectionist is well enough acquainted to insure good operating results but about which he knows slightly less than is desirable for obtaining the *best* results.

Information concerning this or that device should be plentiful and easily available for every projectionist everywhere. It is not implied here that such is not the case. But recent experiences tend to bear out an earlier impression that the job of introducing talking devices was accomplished with far more emphasis on the distribution end than on the score of insuring the best operating results. The statement has been made that devices of this character are "foolproof." But what may be one man's estimation of something "foolproof" may only be the instrument for occasioning considerable trouble for another.

"The Man Behind the Gun"

In bringing out these talking devices the sponsors assumed the responsibility of seeing that nothing was left undone in providing the best possible operating conditions.

Fox-Case has done much to insure for their Movietone the best possible operating results by the publication of their Movietone Bulletin aimed directly at the projectionist, and their lead in this respect may well be followed by the sponsors of all other devices now on the market or soon to be brought out. THE MOTION PICTURE PROJECTIONIST will do its utmost in publicizing these devices. The co-operation of the projectionist, the man in the field, is solicited—for when all is said and done, he is, more than ever, the "man behind the gun" and the fellow upon whom rests a large share of the responsibility for the popularization of "talking motion pictures."

"Talkie"-Mindedness

Keeping in mind all these points, then, the projectionist is irrevocably committed to be "talkie"-minded, to be alert and ever on the go for more information—and then some more. Whether in these columns or elsewhere (the medium matters not), wherever there appears information about this or that angle of this or that device, study it, absorb it and store it away in your mind for that day, not far distant, when you will need it, and probably a lot more, in order to keep step with the next man.

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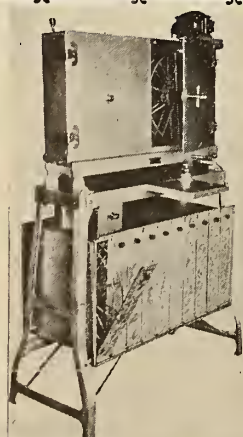
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Some of the many subjects to be found in this Volume are: Projection Angle, Arc Light Source, Carbons, Condensers, Electrical Action, The Film, Generators, Fuses, Insulation, Lenses, Light Action, Optical Terms—their meaning, Picture Distortion, Projection Room, Practical Projection, Resistance as applied to the projection circuit, Screens, Spotlights, Switches, Wiring, etc.

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The New Model M Simplex

(Continued from page 17)

new stand is an important factor in eliminating vibration.

Ease of Operation

To tilt the projector, it is necessary simply to release locking handle (A), attached to rear adjustable support, by turning it to the left—loosen pedestal adjustment locking nuts B and C—and pedestal adjustment hand wheel (D) can then be easily turned with either hand to give desired angle. Micrometer adjustment can be made by means of the hand wheel, and compression springs (E) on rear adjustable support make this extremely comfortable, as these can be easily regulated by knurled nuts to eliminate weight action or, if desired, to deliver powerful upward pressure. When A, B and C are again locked, the Projector is held rigidly in the proper position.

The lamphouse can be placed in position for slides very quickly and without difficulty by loosening two knobs (F and G)—firmly grasping slide-over arm handle (H) and drawing it to the left for the correct placing. Lamphouse carriage (K) turns easily on Lamphouse Pivot (N and at G) and slides almost without effort over lamphouse carriage rod (I) and rear adjustable support. The operation is remarkably simple and comfortable as the long slide-over arm (J) with the auxiliary arm (P), stabilizes the movement while permitting full flexibility of action. When F and G are again locked, lamphouse carriage (K) is held rigidly in position.

The lamphouse carriage of the New Model M Stand is much longer than heretofore, providing greater distances between centers to insure stability and supplying a full firm base for the largest size lamphouse. Lamphouse carriage has adequate openings providing ample ventilation for the lamphouse.

Rear Adjustable Support

The rear adjustable support is an entirely new feature of the Simplex, and for the first time on any Projector provides an adequate rear support which is an integral part of the stand. The rear adjustable support is substantially constructed and so designed that the largest lamphouse may be used without in the least disturbing the balance of the projector. The rear adjustable support, consisting of an upper fork (Q), two rods (R) and a lower fork (S), swings on the pivot casting (T).

When the locking handle (A) operates, it releases a powerful friction lock and support rods (R) are free to slip through the lower fork (S). When the locking handle (A) is released, the adjustable support ceases to act and hangs idle from the

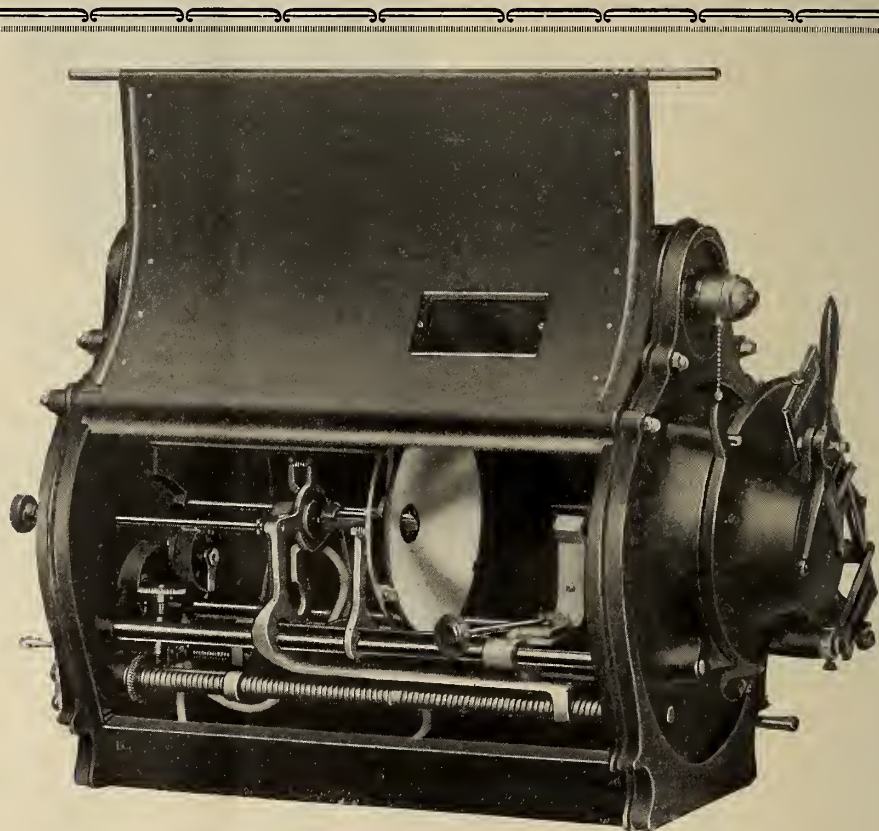
swinging table. When locked, the rods and two forks constitute a structure that firmly connects the swinging table to the base. The 100-ampere switch and switch box are attached to the rear adjustable support, which will easily carry a greater weight, if necessary, without in the least reducing rigidity or weakening the stand in any way.

New Base Design

The base is also a radical departure in design and construction as it is much

wider, quite a little longer, rests on six adjustable leveling points and much heavier material is also used. A foot motor switch (U) for starting and stopping the Projector is supplied, but the conduit is not furnished, although a four-inch opening (V) for installation has been provided in the base.

While there is some slight resemblance between the front of the new Simplex Stand and the former Simplex Pedestal, in all other particulars they are different.



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The Future of Projection

By Gerald W. Link

and Other Features

JUNE, 1928

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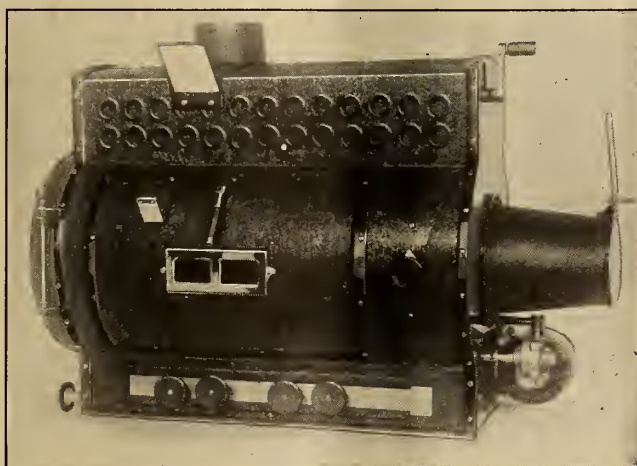
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JUNE, 1928

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Television Progress

DEVELOPMENTS in the radio vision field have been so rapid in the past few months that the leading technicians in that field of work are predicting the complete practicability of television pictures within two years at most. Almost two years back wide publicity was given the successful attempt of C. Francis Jenkins of the Jenkins Laboratories, Washington, D. C., to demonstrate his television apparatus to a select group of high Government officials.

Although Jenkins clearly demonstrated the practicability of television, the die-hards and scoffers were unconvinced. But recent advances in the television field have been so pronounced that even the scoffers must be convinced of the nearness of the day when television will take its place with firm footing alongside of the radio.

Ask Television License

Successful television tests conducted recently at the Federation of Labor Tower at Navy Pier in Chicago have prompted the sponsors of a radio vision apparatus to apply to the Federal Radio Commission for a license to broadcast television pictures. Should the license be granted, the broadcasting of television pictures will commence at once, according to the sponsors of the project. For the present it is planned to restrict the use of the apparatus to the sending of pictures only, without any sound accompaniment. This latter phase of the process is, however, easily possible and is being developed apace.

C. Francis Jenkins has been outspoken in his opposition to the general use of radio pictures with sound accompaniment, his contention being that pictures alone suffice to tell a story. He admits, however, that there will be occasions where audible radio will be useful. For that matter, Jenkins is also opposed to "talking" movies on the ground that they are an anomaly and will have no great or permanent attraction for the public, except for its transient novelty.

But whatever his views on "talkies," Jenkins is in the front rank of those who advocate radio vision as entirely practicable and an added means of enjoyment. His confidence in the application of his apparatus now seems to have been wholly justified.

Wage Scales in Australia

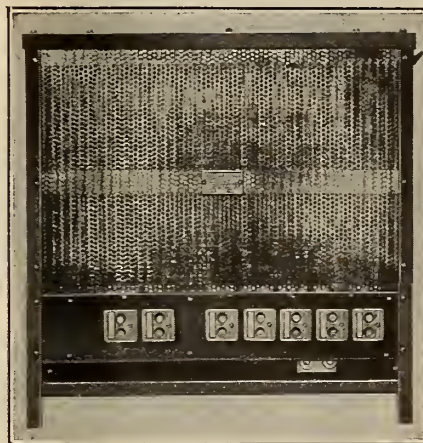
The average weekly wage scale of projectionists in Australia is \$38, depending on the number of shows worked. Many theatres in that country have only one complete show a day, and the average weekly wage for this is \$25. For overtime work the rate for many theatrical employees is by the performance, but the rate for projectionists is by the hour, the same as in this country.

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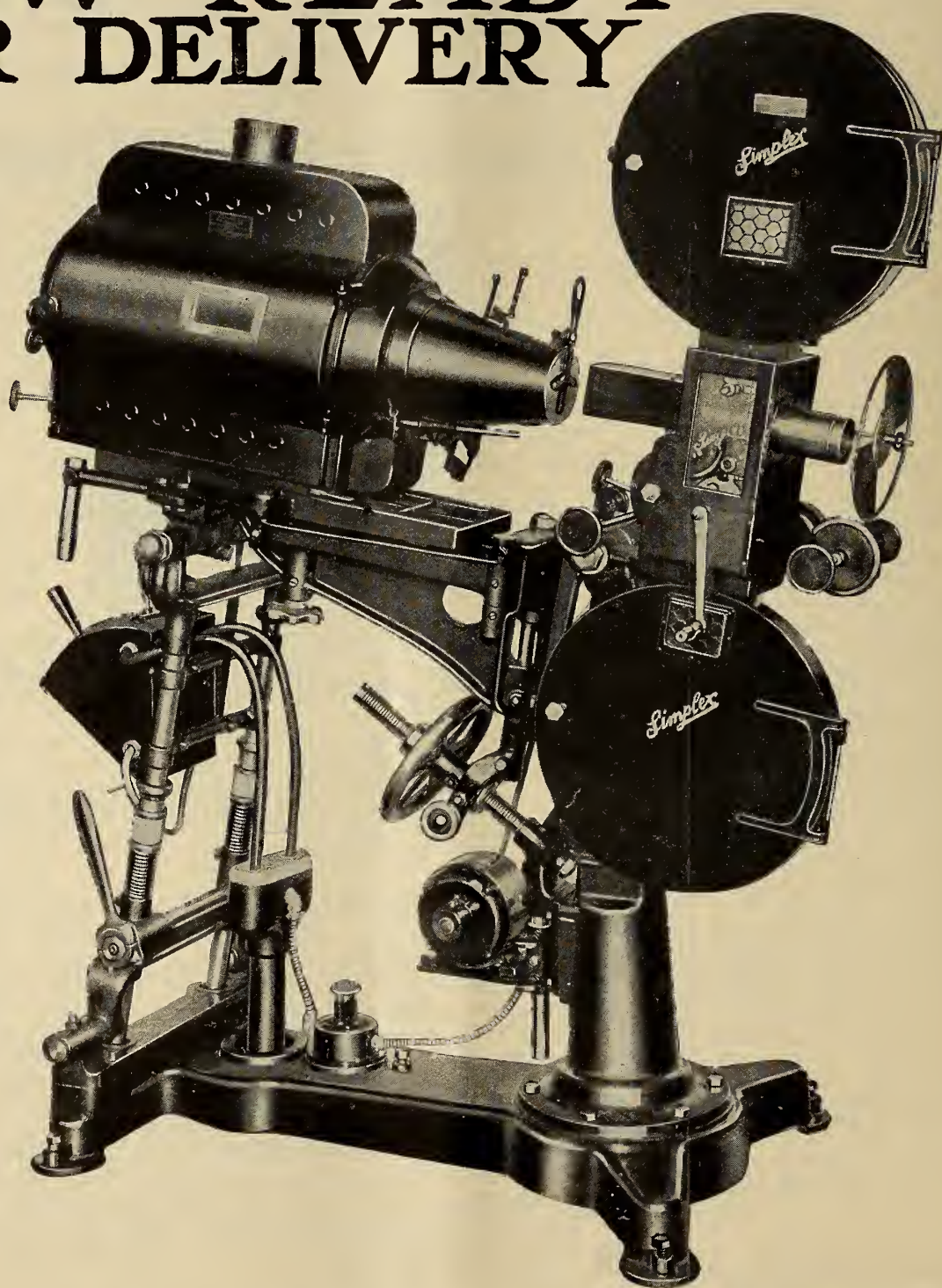
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The 29th Convention

By BOONE MANCALL

THE twenty-ninth Convention of the International Alliance of Theatrical Stage Employees and Moving Picture Machine Operators of the United States and Canada is to my mind the most significant gathering in the long and honorable career of this organization. The startling changes that had suddenly electrified the moving picture industry—the introduction of sound pictures and the development of new and radical projection equipment—these things predicted that Detroit would buzz with excitement, with ideas, with programs, and with new policies. It anticipated achievement of a constructive character. The convention did not disappoint anyone.

Local Autonomy Preserved

Under the capable leadership of International President Canavan the convention functioned smoothly and efficiently. The new force in projection was given right of way. When the convention adjourned on Friday afternoon, June 8, the moving picture machine operators of the United States and Canada had a definite policy of action toward sound pictures and any other new element that might enter between now and the next International gathering.

Local autonomy was as usual respected in all deliberations and no action was taken that would conflict in any way with the problems and conditions of individual local unions. Such problems as were in its jurisdiction the convention disposed of in a masterly way. Where the local had right of way the convention indicated in broad and constructive manner what were the most effective policies to pursue.

Best Convention Ever

President Canavan informed the writer, after the convention had adjourned, that it was the most successful gathering of the craft he had witnessed and had accomplished the most. It was certainly the largest, nearly eight hundred delegates crowding the hall every day. It is said that the next convention will see over a thousand delegates—so fast is the craft growing, due to the pressing need for more men equipped by temperament, skill and intelligence to carry on the work.

The delegates began to assemble in Detroit almost a week before the convention opened. Most of them stopped at the Tuller Hotel, a few were scattered in other hotels and in the homes of friends. The General Executive Board had its headquarters at the Tuller, where it had been meeting for two weeks prior to the convention, winding up all business for a complete report to the delegates. The entire staff and records of the International office in New York had been moved to Detroit for the occasion. The convention proper met in Moose Hall, within walking distance from the Tuller.

The entertainment of the delegates fell, of course, to the two Detroit locals, Operators' 199, and Stage Hands' 38. Brother Max Rubin, of 199, and Brother H. C. Griffin, of 38, were tireless in their efforts to please the visiting host. The weather was in an ugly mood most of the week.

The convention opened on Monday morning June 4th. Following the call to order, the convention was addressed by Brother Griffin (38, Detroit), who introduced the other speakers and guests of the convention, the Honorable Judge Frank P. Murphy of the Detroit Recorder's Court;

THE members of Local 199 of Detroit and the members of Local 38 of the same city deserve the thanks of the entire Alliance for the splendid way they played the difficult part of host to the Convention. Both Locals had large committees on hand to greet the incoming Delegates and help make them comfortable. Both committees were courteous and helpful to the extreme. They were ready at all times of the day and night to be of service. Not even the rain—and it rained in Detroit almost all through the Convention period—dampened their efforts. Even the ladies of the Convention were entertained by wives mothers and daughters of the Detroit members. Local Unions everywhere are sending their appreciation to the two Detroit Locals. Local 306 of New York at its first meeting following the Convention, ordered that embossed and illuminated parchments be sent to 199 and 38 in appreciation. It will be long before the almost herculean work of Brother Max Rubin and Brother H. C. Griffin are matched.

Charles E. Lougheed, who represented Frank X. Martel, president of the Detroit Federation of Labor; President Joseph N. Weber, of the American Federation of Musicians; John Gilson, International President of the Billposters and Billers of North America; Charlie Case, President of the Building Trades Department of the State of Ohio, and the Honorable Clarence McLoyd, member of Congress from the state of Michigan.

International President made appointments to the various committees who were to do the real work of the convention. This marked the end of the first day's session.

President's Report

The second day was taken up with the reading of the President's report by Vice-

president Fred J. Dempsey and its apportionment among the various committees for consideration. Then the report of the Board of Trustees was read. Announcements of committee meetings and others of a general nature were made.

There followed the reading of the report of the General Secretary-Treasurer by Vice-president George Browne, Mr. Green being unable to read it himself because of pressure of organization business in the convention office.

On the afternoon of the second day's session the convention was addressed by the writer as editor and publisher of THE MOTION PICTURE PROJECTIONIST. During the course of his talk he outlined the reasons for the entrance of this paper into the craft, its policies and purposes and its plans for the future.

The third day the report of the Special Committee was read by Vice-president George E. Browne. There was some discussion on the floor. President Canavan answered questions from the floor and cleared up many doubtful points.

Woll Represents A. F. of L.

In the afternoon the convention was addressed by Matthew W. Woll, member of the Executive Council of the American Federation of Labor and President of the Union Labor Life Insurance Company, on the history of the company and the advantages of holding one of its policies. He was followed by President Canavan, who also stressed this advantage. There followed the report of the Grievance Committee.

On Thursday morning was held the nominations for International officers. By this time the convention knew that President Canavan had finally been persuaded to succeed himself, because his intelligence and great abilities and understanding of the duties of the office needed him more than ever. The convention nominated him and also nominated William E. Monroe of Local 1, New York City, for the same office. Nominations for the other offices followed and in only two other instances were there any but administration candidates.

Increase Executive Salaries

On this day one event took place that will remain to the everlasting credit of the craft. That was the raising of the salaries of the International President and General Secretary-Treasurer. We speak of this in another place in these pages.

The fifth and last day of the convention was taken up with the election of officers. The entire Administration ticket was re-elected. Resolutions thanking the two Detroit locals for their hospitality were made and other unfinished business attended to.

The twenty-ninth convention adjourned at 4 P. M. on Friday, June 8.

Laws and Vagaries of "Hot" Wire Circuits*

By PROFESSOR C. M. JANSKY

AN alternator with coils connected in series, and with only two terminals is called a single phase alternator. Such an alternator generates an electromotive force whose intensity fluctuates, and when such an alternator is connected to a two-wire circuit, the resulting current fluctuates in like manner. Both the e. m. f. and current fluctuate in intensity with time, and at regular intervals reverse their direction, and yet they are measured in volts and amperes. How can this be, or what is meant by 100 volts a. c., or 50 amperes a. c.?

The ampere is the unit electrical current and it is defined and determined in terms of the mass of silver the current will deposit per second from a standard solution of silver nitrate. If the amount of silver deposited by a steady current in an hour is 4.025 grams, the current is said to be one ampere. But an alternating current will not decompose an electrolyte, for while flowing in one direction it will force into solution just as much metal as it took out of solution when flowing in the opposite direction. Plainly then, the electrolytic method of measuring an alternating current can not be used.

Every user of electricity knows that when an electric current flows through a wire, the wire becomes warm or hot as the case may be. That is an electric current heats a conductor by virtue of the conductor's resistance, and this heating is independent of the direction the electrons flow. An alternating current is used for lighting or heating incandescent lamps just as readily as a direct current. This conversion of electric energy into heat by the resistance of a conductor is in accordance with what is known as Joule's law. Joule discovered not only the mechanical equivalent of heat, which is the fundamental principle of power engineering, but he also discovered the law that governs the development of heat in a conductor.

A Stream of Electrons

We have said several times that an electric current is a stream of electrons, and that the measure or intensity of the electric current is the number of electrons passing any point in a conductor per second. This number of electrons crossing a given section of the conductor can be varied in either one of two ways: either by changing the supply of electrons, or by changing the speed with which they travel. The former method is exemplified in the plate circuit of a vacuum tube when the temperature of the filament is raised. As the temperature increases, more electrons are "boiled out" of the filament.

The second method is exemplified in any metallic conductor when the voltage applied is changed. Metals seem to have an unlimited supply of electrons which

are put into motion by an applied e. m. f. An increase in the current is secured by increasing the average velocity of the electrons, and hence the number per second which passes any point in the conductor. If the average velocity is doubled, the same number of electrons will pass a cross section in one-half the time, that is, the current has been doubled. The kinetic energy of any moving mass is proportional to the square of its velocity; therefore, doubling the velocity of the electrons has quadrupled their energy. The energy converted into heat and dissipated in the conductor is thus seen to be proportional to the square of the number of electrons flowing past a point in the conductor in

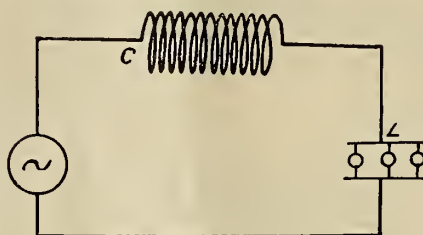


Fig. 1

a second, or in the words of modern electromagnetic theory, the heat is proportional to the square of the current. This is the law discovered by Joule.

Since the energy converted into heat is proportional to the square of the current intensity, it is evident that the rate at which the heat develops changes as the intensity of the current changes, but no matter how the rate of heat development varies, for every cycle of an alternating current a definite quantity of heat will be generated, and so long as the frequency and maximum values are constant, the heat developed in the same resistance for one cycle will exactly equal that developed in the next cycle. An ampere of alternating current is, therefore, determined by sending the current through a fixed resistance and measuring the heat development in a specified interval of time. When the heat developed is the same as that developed by one ampere of direct current, the alternating current is said to be *one ampere*.

In short, the magnitude of an alternating current is said to be the same number of amperes as that of a direct current which develops the same quantity of heat per second in a given resistance. In mathematical language this means that the square root of the average of the squares of the instantaneous values of the alternating current for one cycle is the measured intensity of the alternating current. This is called the effective value or root-mean-square value.

This relation is true, no matter what form the alternating current may have, but if the current follows the simple sine

law, then there is a definite and fixed relation between the effective value and the maximum instantaneous value. It can be shown by mathematical analysis that the effective value of an e. m. f., or current, which fluctuates as a sine wave, is equal to one-half the square root of two times the maximum value, or 0.707 of the maximum value.

These characteristics are of importance in all alternating current installations, especially in those for high voltages. The peak voltage of an alternating current is 41 per cent higher than the nominal voltage, and the insulation of the conductors must stand this excess voltage. Furthermore as the alternating current falls to zero twice in one cycle, it is easier to break an alternating current than a direct current of the same tension, but due to the higher voltage and inductance of a-c. circuits, switches of capacities above 1,000 amperes have a lower rating for alternating current than for direct current.

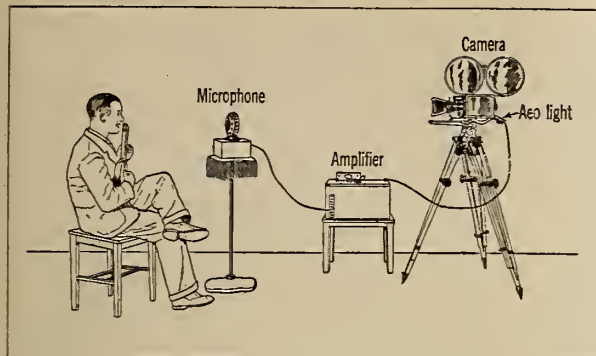
Not Unlike Motion of Steam Engine

In principle the delivery of power by alternating currents is just the same as by direct currents, but the effect of the characteristics heretofore discussed is much enhanced by the periodic reversals of the alternating current. To many persons it seems strange that power can be delivered continuously in one direction while the medium or agent for conveying the power reverses its direction of motion regularly. This, however, is not much different from the delivery of power continuously in one direction by the reciprocating, or to and fro, motion of a steam engine. While the piston of the steam engine reciprocates, its motion is always in the direction of the steam pressure and hence absorbs the energy of the steam. In a steam turbine the direction of motion of the rotor is continuous, but it likewise moves in the direction of the steam pressure and hence abstracts energy from the steam which it then transmits to the machinery it is driving. The development of power by the reciprocating and turbine engines are good analogies for power developments by alternating and direct currents but they have other similar characteristics than merely continuous or reciprocating motion.

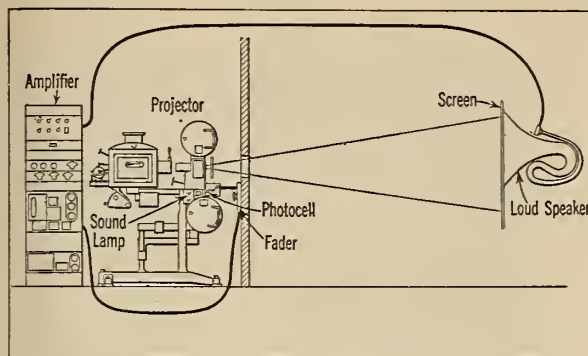
In the reciprocating engine, the piston has its greatest speed near the center of the cylinder, and it reverses its direction of motion at the ends. As the piston has weight, it requires work or energy to accelerate the piston from one end of the cylinder to the middle, and then as the speed decreases, the kinetic energy of the piston decreases. There is thus an absorption of energy for one-quarter of the complete cycle of the motion of the piston, a return of that energy for the next quarter cycle and so on.

(Continued on page 23)

*Electrical Workers' Journal.



Recording
and
Repro-
duction
Processes



Movietone Equipment*

By FOX-CASE ENGINEERING STAFF

BEFORE discussing in detail any particular part of the Movietone equipment, it might be well to give brief mention of the manner of reproduction.

The positive film is run through a standard type of projector which is modified by the addition of an attachment for reproducing the sound. This attachment is located directly below the mechanism of the projector head, and the take-up magazine is lowered and fastened to the sound attachment.

The beam from a small, high intensity electric light is concentrated by an optical system containing a slit and brought to focus as a fine line across the sound track as it passes through a sound gate. The film at this point moves uniformly, and at the same speed as used in recording—that is, at 90 feet per minute. On the side of the sound gate opposite the light is a photo-electric cell, which responds to variations in the amount of light striking it by letting pass a varying electric current.

Sound Record Controls Light

The more light, the more current, and it responds practically without lag to the fluctuations in the light received. The density of each particular line of the sound record as it passes through the beam in the sound gate determines the amount of light passing through the film into the light-sensitive cell, and the current through the cell is therefore modulated according to the sound record.

There are 14½" of film between the picture gate and the sound gate, but since the sound record is displaced in advance of the picture, the two reach their respective gates at the same time. The sound and the picture are always in this same relation, and they are therefore always properly synchronized.

Amplifying System

The photo-cell output is strengthened by a small amplifier built into the sound attachment and then carried to the fader, a control by means of which the sound vol-

ume is regulated during showing of the film. From the fader the current is carried to a public-address type of amplifier of size and power suitable for that particular theatre which the sound is required to fill. The output of this amplifier passes through a distributor panel and to the loud speakers located preferably behind the screen, from which the sound issues in synchronism with the picture.

As it is vitally important to maintain uni-

form projection speed in motion pictures with sound, the driving motor is provided with a vacuum-tube-operated control box that automatically corrects for changes in the voltage of the current supply mains and maintains the motor speed constant.

A high standard of reproduction is possible with this equipment, the results obtained depending in large measure on the care and attention given the equipment by the projectionist.

The Photo-Electric Cell

THE term "photo-electric cell" is somewhat misleading since from the word "cell" one might naturally believe that it had something to do with an electric battery operated by light. This, however, is *not* the case; and a more accurate term for the light sensitive tube used in Movietone reproduction would be "photo-electric valve."

Its action is that of a valve. Light passing through the sound record on the film and shining upon the material inside of the photo-electric tube (Western Electric Code No. 238A) permits an electric current to flow through the circuit in which the tube is connected. The amount of this circuit is directly proportional to the intensity of the light passing into the cell and this intensity is, of course, determined and varied by the sound lines on the film as they pass through the sound gate.

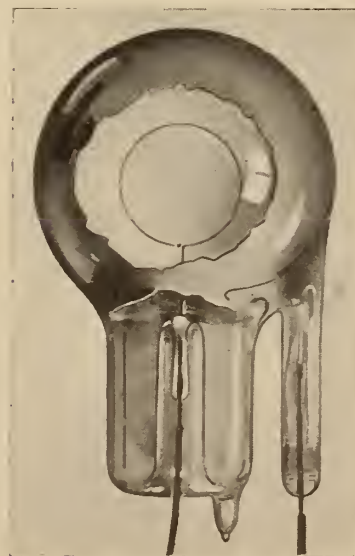
The photo-electric cell consists first of a glass bulb having two lead-wires or connections. One of these is connected to a ring-shaped conductor at the center of the bulb and this is the anode or positive electrode. This is always connected to the positive or + wire of the circuit. The other wire connects on the inner surface of the bulb to the light sensitive material which forms the cathode or negative electrode. This is always connected to the negative or — wire of the circuit.

Delicacy of Construction

In order to make a better connection with the light sensitive material, a coating of silver is first formed within the

bulb over the cathode lead-in wire, and then the light sensitive material is placed on top of the silver. A round opening is left in the coatings on one side of the bulb to serve as a window for the light to enter.

The light sensitive material in the photo-electric cell is a special form of the metal potassium. This metal coats the inside of the glass bulb over the silver film and when properly treated usually has a beautiful light blue color. Besides the potassium metal there is within the bulb a small amount of a rare gas such as



The Photo-electric Cell

*Courtesy of the Fox-Case Corp. Some of this material has already been privately circulated, but only among a limited number of projectionists. Those who will soon be operating "talking" devices should have the opportunity of familiarizing themselves with this information.

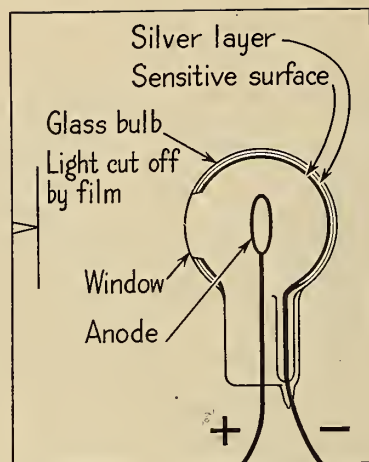


Fig. 2. Light cut off

argon, the function of which will appear presently. While the photo-electric cell is quite simple in appearance, its manufacture is a complicated and rather highly technical process.

The valve action of the photo-electric cell will now be described in outline. The cell is connected in circuit with a battery whose electrical pressure is in the order of 100 volts. The lead from the central ring is connected to the positive wire and the lead from the light-sensitive surface is connected to the negative.

How It Functions

Under normal conditions when the sensitive surface is not illuminated, the gas in the cell is an effective non-conductor, and in the unilluminated condition no current will flow in the circuit, as there is nothing to carry it across the space inside the cell between the sensitive surface and the anode. This is represented schematically in the illustration (Fig. 2), where the light from the sound lamp is considered to be entirely cut off by a dark line in the film.

When light passes through the film onto the sensitive surface inside the bulb, the conditions are instantly changed. Electrons (minute negatively-charged particles), are set free from the sensitive surface and are driven toward the anode

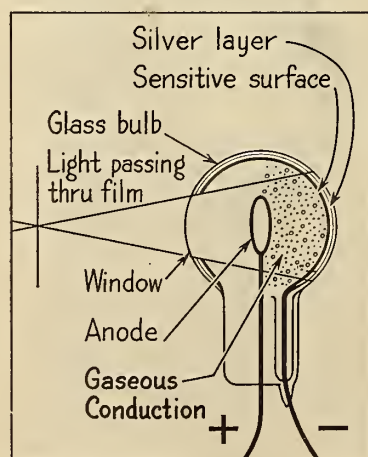


Fig. 3. Light enters cell

by the voltage on the tube. This flow of electrons in itself constitutes a small electric current, but by the action of the electrons on the gas in the tube the flow of current is very considerably increased. The gas becomes "ionized"—that is, it breaks down electrically and becomes a fairly good conductor instead of an insulator.

Light Controls Current

A current now flows in the circuit, and the condition is shown schematically in Figure 3. The amount of light entering the photo-electric cell controls the current flowing through it just as effectively as a valve controls the flow of water in a pipe. Intermediate current values correspond to the gray lines in the sound track, and the fluctuations of the current through the cell are a faithful copy of the fluctuations of the sound record.

The cell is connected to its battery and to the first stage of amplification in the sound attachment as shown in Figure 4.

Things You Must Watch

1. Handle photo-electric cells carefully. They are the electrical eye of your apparatus.
2. Keep them away from intense heat.
3. Do not tighten the supporting clamp too tightly or it will crack the glass. A cracked cell will not work.

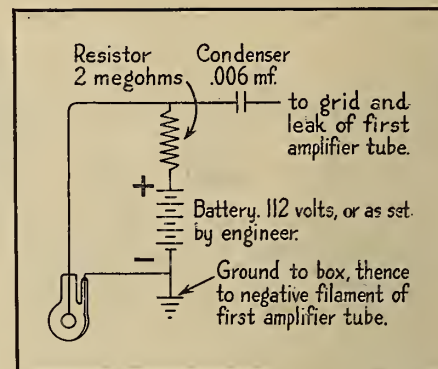


Fig. 4. Electrical connections

4. Be especially careful of the seal-off tip and of the seals around the lead-in wires. A broken seal ruins the tube.
5. Be sure that the window faces the light beam. Sometimes the vibration of the projector will loosen or turn the cell. Also be sure that the window is free from dirt or oil.
6. Do not put a strong light on the cell when it is connected in circuit.
7. The lead coming from the ring or anode must be firmly soldered to the amplifier. (Use only rosin core solder.)
8. Never let the soldering iron touch the glass bulb.
9. The lead coming from the cathode must be connected to the amplifier box.

How to Splice Film

WHEN repairing Movietone film make it a careful and workmanlike job, because it well justifies the effort by keeping up the standard of your show and in warding off later difficulties.

Cut out as few frames as possible. A break in the sound record is usually even more noticeable than a break in the picture, and this is especially true of speech and music. Do not, however, go to the extreme of saving weak film that will cause trouble on the next time or two through the projector.

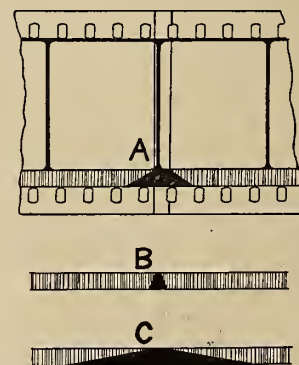
How to Paint Splices

A plain splice, no matter how carefully made, will give a click from the speakers as it passes through the sound gate, since the two edges and the overlap disturb the uniformity of the sound track. If the splice is painted over in black, as shown at A in the figure, it will be made almost inaudible, as there is no sudden change in the light passing into the photocell. If the mark is made too short (Fig. B), the click will be very pronounced; whereas if it is made too long (Fig. C), there will be a noticeable pause in the sound due to the lines being largely painted out. About $\frac{3}{8}$ " to $\frac{1}{2}$ " at the base, as shown in Figure A, will be best.

Houses showing Movietone will shortly be supplied with a black celluloid lacquer for painting whatever splices it is necessary for their projectionists to make. This lacquer should be applied to the shiny or celluloid side of the film and not to the

emulsion side, as it will then be more permanent. It dries almost instantly, adheres tightly, and is much more satisfactory than India ink or other substances. If for any reason it should be necessary to remove it, a rag soaked in lacquer thinner than that originally applied will do the trick.

Splices in the negative in making up Movietone subjects are taken care of in the printing. One may observe them by the triangular dark marks along the sound track near changes of scene.



Painting out splice noise:

- A—Correct method, quiet.
- B—Too short, will click.
- C—Too long, keeps sound off.

When to Change the Sound Lamp

IT is very important that the sound lamp be changed at proper intervals to insure a high standard of sound reproduction. Now, the question is, "How often should it be changed?"

This question cannot be answered by saying every so many days or hours, but depends to a great extent upon the lamp itself. The projectionist should look at these lamps before each show and note carefully the condition that they are in. This can be quickly done by removing the holder from its support and examining the lamp by holding it up to a light. At the first sign of blackening of the glass, whether at the top or at the side of the lamp, discard it. There is a temptation to use the lamps "just a little while longer," but this is a bad procedure.

When the lamp begins to discolor, the quantity of light entering the photo-electric cell is greatly decreased, resulting in loss in both quality and quantity of reproduced sound.

Discoloration a Sure Sign

Discoloration is a positive sign that the lamp has passed the peak of its efficiency and has a very limited useful life.

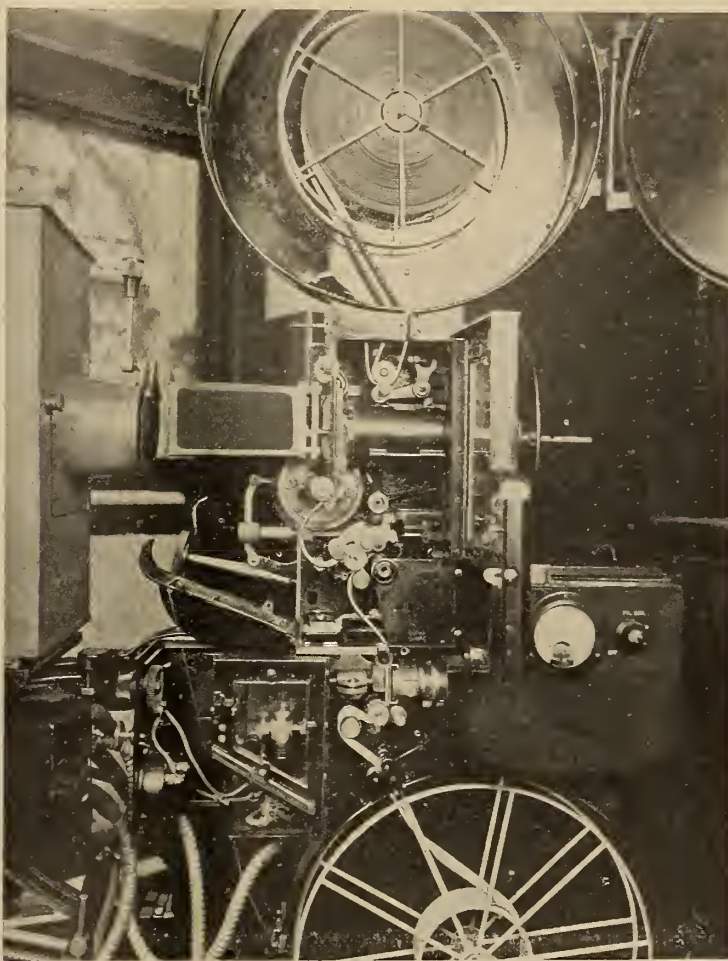
In the accompanying illustration we have three types of light:

A is a lamp that has been used but a short time and is in perfect condition. You will note there is no discoloration and the filament does not sag.

B is a lamp that is badly blackened or discolored. This light is a "horrible example" for it has been used long after it should have been discarded and has undoubtedly resulted in a great loss of quality in the sound reproduced.

C is a lamp in which the filament has sagged and the glass has become discolored. The filaments of the sound lamps are constructed so that sagging is a rare occurrence; but in the event you do have a lamp in which the filament has sagged, *discard it at once* even though the lamp is not discolored. It is impossible to secure a straight filament image if the filament itself is crooked.

It is far better to replace a failing



Projector threaded, showing correct loops

sound lamp at the cost of a few cents than to run the risk of spoiling the sound reproduction. Care in watching the condition of the sound lamps will

insure much better results and will give a great sense of satisfaction in knowing that you are taking no unnecessary chances of stopping a show.

Threading Movietone Film

IN threading up Movietone film it is important to watch the size of the lower loop of the projector and the loop just above the sound gate, which may be termed the "sound loop." These are

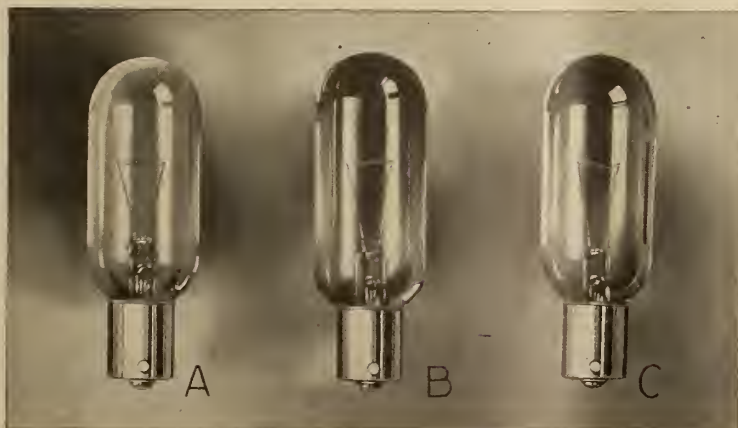
shown in correct size in the accompanying illustration.

To form these loops correctly set the mechanism in position so that the intermittent is just ready to move. The cutting blade of the shutter will be at the bottom for this setting. Allow just so much slack in the lower loop that the finger held straight through inside it will be barely touching against the lower loop guard in its vertical position.

The guard is turned down in the illustration to better show the loop, but in the vertical position the loop would just extend to it. For the sound loop, pull the film tight through the sound gate and ease back two sprocket holes.

Movietone film is made with the sound record displaced $14\frac{1}{2}$ " below the center of the picture in the aperture with the intermittent about to move, and if the projector is threaded as shown above, there will be just this distance along the film between the center of the aperture and the image of the slit. A check-up

(Continued on page 14)



A—perfect; B—blackened; C—Sagging Filament

As *The* EDITOR Sees IT

T ¶ *Young Blood!*

THE twenty-ninth Convention of the International Alliance was a young men's convention. This is the amazing impression I got the moment I arrived in Detroit and it was confirmed through Convention week during which I personally met and spoke to nearly three hundred projectionists, delegates from every part of the country. I did not exactly expect to find old men. I did expect, however, to find most of them of middle age with a fair sprinkling of young blood. I doubt if I met more than a half dozen who were over thirty. If I did, then they preserve themselves marvelously. Either the air, or the conditions under which projectionists outside of New York work must be a great retainer and restorer of youth. This is said in all seriousness. I met a young man from Port Arthur, Texas, Derrough by name, who was under twenty-five. He is the B. A. of the Port Arthur Local. His cheeks were red with youth and his eyes were still without shadows. I met Abbott of El Paso, who looked as if he lived always in the open. And Medill of Houston. Oh, I met so many young men who came to Detroit to listen and learn, to become fired by the example of older, wiser and more experienced Delegates, to go back to their Locals and bring about better conditions. I myself basked in their refreshing youthfulness and was inspired by their sincerity and feeling of responsibility toward the great craft of which they felt themselves so keenly a part. The craft needs these young men. The yeast of a tremendous, startling change is now in ferment. Willing, capable hands will be needed to take hold and build a bigger and greater craftsmanship. I am satisfied that these young men I met in Detroit, with their shining eyes and glowing cheeks will take hold capably. They are already leaders in their respective towns and cities. They will not fail when bigger demands are made on their intelligence and their abilities. This is the message which I wish to broadcast to the craft at this time.

I ¶ *PROJECTIONIST Welcomed*

I ANTICIPATED the Convention with a great deal of pleasure. For the first time since this publication started I was to have a chance to meet and talk with several hundred of my subscribers and with those whose generous co-operation within their Local Unions had raised this paper from an unknown quantity to a commanding position as the acknowledged publication of the craft. The reception which I received has inspired me and my colleagues who labor with me each month to turn the paper out to make it a better and bigger publication, to meet the demands of the craft for complete and exhaustive news pertaining to their work and to make it the proud boast of every organized projectionist in these United States and Canada. Only those who have worked on a publication know the doubts and the questionings which constantly assail the editor who is writing to an unseen and unknown audience. Intimacy of a sort there already was: for we had received and are receiving daily numerous letters from all over the country. But who are these men and what do they look like, and what are they thinking about us and about the craft? How and when can we meet them? Well, I did meet them. As someone else has said, I met them from the bars of Windsor, Canada, to the pralines of New Orleans, from

the sunny slopes of the Pacific to the Eastern shore. I found how truly THE MOTION PICTURE PROJECTIONIST was respected for its sincerity and its efforts to familiarize the members of the craft with the new developments in studio, laboratory and projection room. I received constructive suggestions of the greatest importance which we shall put into effect rapidly.

W ¶ *The New Order*

WHAT is this change which everybody is predicting will come upon the craft shortly? Why this sudden, pressing need for capable leadership? Perhaps it is not so much a change as an evolution. Only it came so suddenly and developed so lustily within such a phenomenally short time that it looks more like revolution than evolution. The introduction of sound pictures of course swept across the craft like a tidal wave and nearly upset it because it caught it napping, caught it too confident and a little indifferent. But to those who had been watching the craft seriously a change was fermenting long before sound pictures came, fermenting underneath the surface and ready to break forth. And it has. The only thing that matters, however, is that it is here and the craft is prepared to meet it with confidence in their abilities to handle this and any other situation which may come along.

T ¶ *Many Problems Settled*

THE Convention was saturated with the greatest seriousness. The problem of sound pictures, or synchronized pictures as they are still called, was uppermost in the minds of all and formed the chief topic of conversation and a great part of the deliberations of the Convention. The Convention under the able leadership of William F. Canavan, International President, and his official family, aided by the advice and experience of Local leaders, made significant progress in standardizing certain important conditions on sound pictures which did not fall under Local autonomy. But each Delegate took back with him a better understanding of the situation gleaned from the experiences of other Local Unions; and it is my belief that the entire craft will benefit. It was said that this Convention was the largest and the best in the annals of the International. It was a revelation for all of the extent and the power, present and future, which the craft has smouldering in it. From time to time this editorial pen will strike off sparks that spring from the remembrance of the Convention activities and proceedings. On other pages in this issue there is more. But before I close I wish to thank those Delegates I met for their kindness, their courtesy, their offer of friendship which I so gladly accepted and cherish; I wish to extend my appreciation to all the Locals in the craft for having sent the finest of their ranks to Detroit to represent them in an International Convention, and it is my hope that the next two years will speed by on wings so that I may again mingle among your representatives in a Convention.

Boone Manacall

Electrical Resistance

By JAMES R. CAMERON

THE question of electrical resistance as applied to a projection circuit has long been a stumbling block to a great number of projectionists. While we admit that the subject is complicated, and some of its phases hard to follow, it is essential that the theory of electrical resistance be mastered if progress is to be made in the art of projection.

Electrical resistance is that property of anything in an electrical circuit which will resist the flow of current. The effect of resistance is to produce heat.

Ohm's Law

The unit of electrical resistance is the *ohm*, and it is so named after Dr. G. S. Ohm, who gave us the series of formulas now known as Ohm's Law; and it will be necessary to thoroughly understand the workings of this law to be able to work out any of the numerous problems in electrical resistance. Ohm's Law states that: *The current is directly proportional to the voltage and inversely proportional to the resistance.*

This means that if the voltage of a circuit be increased, the current will proportionally increase; and should the resistance of a circuit be increased then the current will be proportionally decreased. Should the voltage be decreased there will be a proportional decrease in the current; if the resistance in the circuit is decreased there will be a proportional increase in current. Expressed mathematically thus:

$$\text{Current} = \frac{\text{Electric Motive Force}}{\text{Resistance}}$$

Current is equal to the Electric Motive Force (Voltage) divided by the Resistance (in ohms), or

$$C = \frac{E}{R}$$

If by dividing the voltage by the resistance we get the amount of current, then by dividing the voltage by the current we

will naturally arrive at the amount of resistance in our circuit, or—

$$R = \frac{E M F}{C}$$

and so to find the voltage all we have to

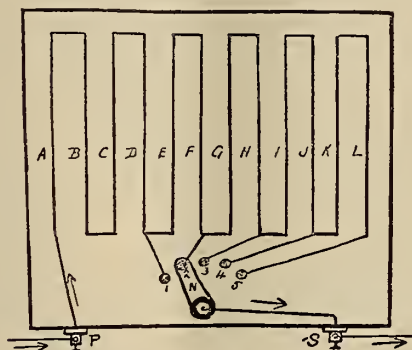


Fig. 2

do is to multiply the current by the amount of resistance in our circuit, or

$$E M F = C \times R.$$

It will thus be seen that, provided we have two known quantities, the third unknown quantity can easily be obtained by the use of the above formulas. For instance, let us suppose that we have a line voltage of 100 and our circuit has a total resistance of 5 ohms; then by dividing the 100 (volts) by 5 (ohms) we find our current to be 20 (amperes).

Finding the Resistance

Provided we knew there was a line voltage of 100 and we were drawing 20 amperes at our arc, then by dividing the 100 (volts) by 20 (amperes) we would arrive at the amount of resistance in our circuit, which would be 5 (ohms).

It is evident from the foregoing that the amount of current we get at the arc depends on the E M F and the amount of resistance in a circuit.

Current encounters resistance when passed over any conductor. Copper, silver, and aluminum are good conductors, so offer very little resistance, while metals like iron and German silver are poor conductors and offered a much higher resistance to the flow of current.

The resistance of any conductor increases as the length of the conductor is increased, and as the diameter of the conductor is decreased; or as the temperature of the conductor is increased (the resistance of insulating material and carbon decreases with an increase of temperature). To find the resistance of a copper wire, multiply its length in feet by 10.5 and

divide the product by its area in circular mils.

Resistance is introduced into a projection circuit for two reasons. First, to bring the supply voltage down to a suitable voltage for maintaining an arc; second, to act as ballast on the line.

The voltage supply generally runs around 220 or 110 volts, and as only approximately 50 volts is required to maintain a d-c arc (for a-c the voltage should be 35 to 40 volts), it is apparent that some medium which will act as a resistance must be introduced to secure the desired voltage across the arc. A majority of projectionists are thoroughly familiar with the construction of various makes of rheostats now on the market, but for the benefit of those who are not, a brief explanation of their general construction and operation will be given here.

Rheostat Fundamentals

A rheostat is constructed of a number of metal coils or grids made of some metal offering high resistance to the flow of current over them, generally iron or German silver. Connected in series, these coils or grids are mounted on a metal frame from which they are insulated, the whole being covered with a perforated metal cover. The first and last coil are each connected to a terminal which allows for the connection of the conductors (Fig. 1).

The current enters the rheostat through terminal P, then passes through the coil or grid A to B, then to C and so on until it has passed through each of the coils in turn, and leaves the rheostat through terminal S. Most of the rheostats manufactured today are of the adjustable type, so constructed that by the turning of an adjustable lever a number of the coils may be cut in or out of the circuit, thus cutting in or out resistance and thereby lowering or increasing the amperage at the arc.

Adjustments

Figure 2 is an elementary drawing showing how this is accomplished. P is the terminal through which the current enters the rheostat, and S the terminal through which it leaves after having passed through the series of coils or grids. As will be seen by referring to the diagram (Fig. 2), it depends on which contact point—1, 2, 3, 4, or 5—the adjusting lever N is placed as to the number of coils through which the

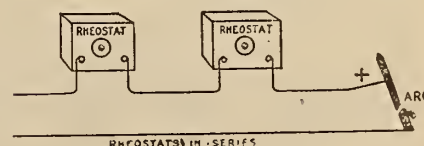


Fig. 3

(Continued on page 21)

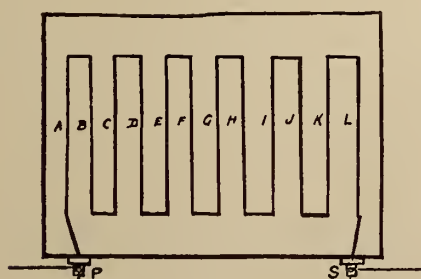
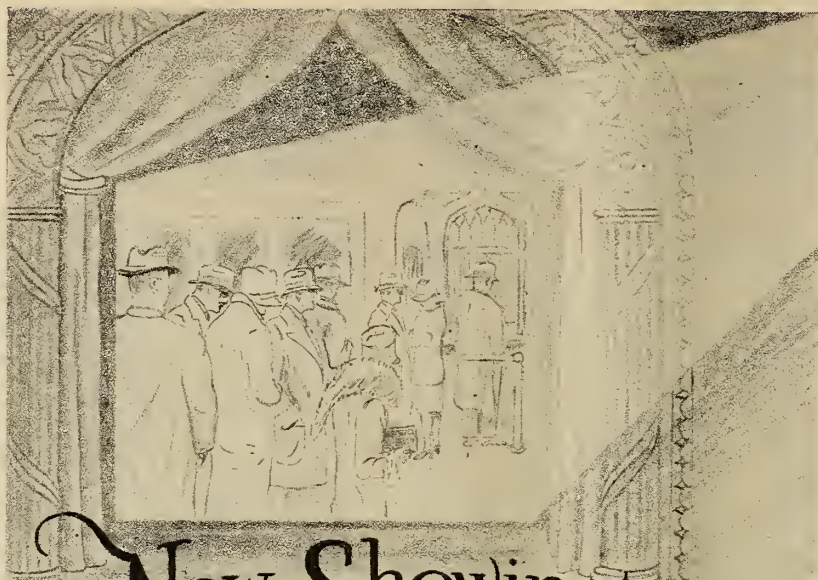


Fig. 1



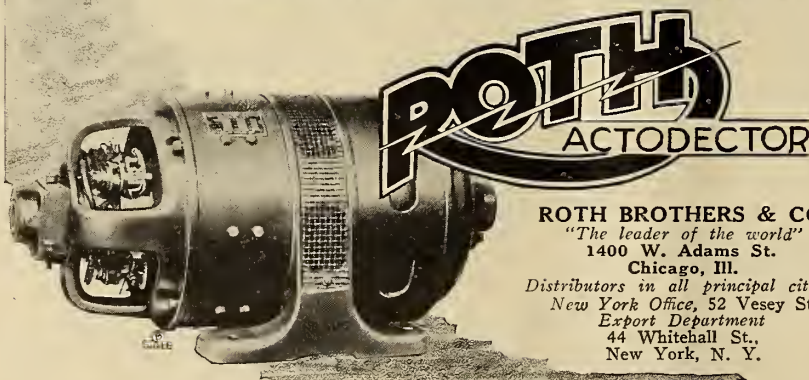
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Movietone Equipment

(Continued from page 11)

may be had with a piece of white leader and a pencil.

Film threaded in the same manner as shown above will be synchronized to the dot.

Sound Gate

BEFORE threading up the Movietone reel examine the sound gate carefully to see that it is free from dirt, lint, or emulsion. If the aperture of the sound gate becomes clogged, it cuts the light off the photocell and weakens its response to the sound modulation on the film. The fader will be turned up high without attaining normal volume in the house, and if at this time the moving film should dislodge some of the dirt, the sound would come on with terrific volume.

Lint also tends to blur the slit image on the film, and unless this image is clean-cut, the quality of reproduction must suffer. If emulsion builds up in the gate it will scrape off more emulsion and result in serious injury to the film.

Clean After Each Reel

Projectionists in houses running mostly Movietone make it a practice to clean the sound gate after each reel is shown, so that it is then ready for the next reel. Where the program is largely silent pictures, with perhaps only the Movietone News with sound, it is advisable to examine the sound gate just before threading up the Movietone. The essential thing is that examination of the sound gate be included in the regular routine of projection. The proper time to do this work depends on the conditions at any particular house.

Amplifier Test

IN testing the amplifier equipment to see that the sound is "percolating" properly some projectionists are inclined to tap the first tube in the 8-B panel and listen for the microphonic tube noise from the horn.

By far the better method is to go back to the projector for the very first step in reproduction and move the finger up and down in the light beam entering the photo-cell. Make this test without film in the attachment and with the sound gate removed. Of course, all the tubes must be turned on and the fader turned part way up to get a sound from the horns. This checks not only from the main amplifier on, but the photo-cell, sound attachment, and fader as well.

The first method will sometimes indicate "O. K." and yet the sound will refuse to "perk" through, due to a difficulty earlier in the system than the 8-B. The finger test gives a real check on the whole outfit.

(Continued on page 18)

Film Condition*

By Trevor Faulkner

FILM distributing organizations are making an effort to keep film in good condition in its passage from theatre to theatre. Nevertheless, by the time it reaches the smaller houses its state of preservation may be exceedingly poor, a fact which cannot but prejudice the entertainment value.

The first step in remedial measures must be to decide what defects shall be styled "poor condition."

My own opinion is that disturbed continuity is the worst defect, and the one which is prevalent in theatres farthest removed from the first run. The second is scratched film. Like the first, it is pernicious because when it has once occurred it cannot be remedied. Then in order come improper splices, weakened perforations, objectionable end signals, and dirt and oil.

Disturbed Continuity

Let us consider *disturbed continuity*. In past years the censor boards in different states have each insisted on their own eliminations and have often removed portions which they have failed to restore as the film passes on its journey. Now, fortunately, the producer is taking such care that the censors do not intervene.

The projectionist may be at fault in two ways. He may forget to replace film omitted to shorten the program; and he may purposely conceal omissions due to accidents. The remedy lies with himself.

The nuisance of bad splicing requires ventilating. The faulty splice is objectionable not only because it means breaks in the machine and because another frame must be cut out in repairing, but because a poor splice may cause the sprocket teeth to skip and ruin quite a length of film. To state the trouble is to state the remedy.

Carelessness the Cause

Scratched film is due almost entirely to carelessness, not only by the projectionist, but in the exchange. Film get scratched not only by going back to the exchange, but *because* it is going back. The projectionist who has film for an important run of some weeks treats it with scrupulous care to maintain it in condition for his own use. It is the film which circulates from theatre to theatre on short runs that gets in such appalling condition. Every few days it changes hands and the responsibility for its condition is shifted.

The kind of carelessness which causes damage is allowing the rollers in the magazine trip to become stilled or clogged with dirt and broken film. Projectionists forget to adjust the tension, or they let the aperture wear and become covered with baked emulsion. They use change-over signals and automatic rewind devices carelessly. Personal care can eliminate damage from these causes, and *personal care is the only remedy*.

However, it is unfortunately true that damage also occurs in the inspection rooms at the exchanges. The habit of allowing the film to slide under the palm of the



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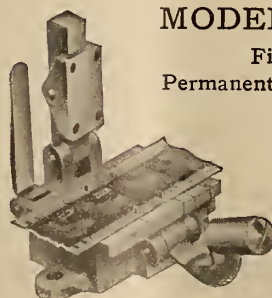
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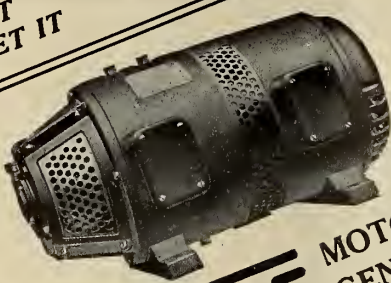
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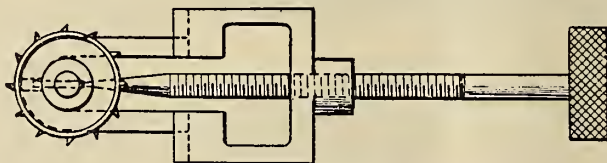
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gloved hand is responsible for long continuous scratches whenever a piece of dirt gets lodged in the fabric. Another error habitually made is the tightening of loosely wound reels. Its effects are the most damaging if the film has previously been spilled on the floor.

Bad Splicing

Bad splicing is next in order. The only useful advice to those who make poor splices is the advice given by Mr. Punch to those about to marry:—"Don't." In fact, this simple admonition applied to careless procedure would cure almost all the ills to which film is heir.

Remedies for Trouble

However, men and machines being what they are, it behooves us to evolve some systematized remedy. This must consist in the establishment of rules so well advertised and so self-evident in their importance that they will be obeyed.

To the projectionist we would say:
Avoid oil in the wrong place; be clean.
Replace worn sprocket wheels.
Adjust gate tension and keep the gate clean.

Make careful splices.
Notify the exchange of loss of continuity and other accidental damage.
Treat the film as though you were the only user.

To the exchange the directions would be:
See that the film is sent out in good condition.

Scrap ruthlessly over-worn and damaged stock.

When these rules are obeyed, and only then, will the millennium of "film in good condition for all theatres" be reached.

I. E. S. 22nd Convention

The Twenty-second Annual Convention of the Illuminating Engineering Society is to be held in Toronto, Canada, from September 17th to 20th, with headquarters at the King Edward Hotel. The First Annual Illumination Congress, of which the above-named convention will be a part, will be held in this country in September at Saranac Inn, N. Y.

The meetings of the latter body will be concluded in time to permit participation in the Engineers gathering at Toronto.

Effect Library at Roxy

The projection department of the Roxy Theatre, New York City, now has a complete library of effect film to be used with film which has no sound accompaniment. Under the direction of Chief Projectionist Art Smith this library has been gradually built up until today it permits the choice of almost any effect.

Included in the library are the following effects: cannon fire, airplanes in flight, German Band, crowds, hurdy-gurdy, fountains, cabaret, and bird effects.

The effects are included on separate lengths of film and are run in the second projector. Amplification is in the usual way. The idea is gaining favor daily, and it is understood that many theatres now having "talkie" equipment will adopt the plan.

The Future of Projection

By GERALD W. LINK

WE are now passing through the golden age of projection. We have just begun a long period during which the familiar apparatus now standard in motion picture theatre booths will be entirely revolutionized. The changes will be not in principle alone—they will also be in design, in the physical appearance and in the manner of their operation. A few years from now much of the equipment in use today will be discarded. The projectionist of the near future will be surrounded by instruments of the most delicate and, scientifically, the most complicated sort. Projection will be almost perfect and the screen will bring forth marvels for the eye which will be created by the experts in the booths.

Whether this day is near or far, it will come. The forces at work to bring it about are to be found in the laboratories and the studios scattered over the land. But chiefly the force that is already far ahead of the laboratories and the studios is in the ranks of the projectionists themselves, whose members have contributed steadily to the advancement of projection and who are even now on the eve of forcing the great change I predict. How they are doing it I shall attempt to show shortly.

While the instruments for producing great pictures in the studios have been developed rapidly to a degree of almost amazing efficiency, the instruments for projecting these pictures have advanced very slowly. Almost every day it is possible to read of the perfection of some new piece of equipment whereby the taking of photographs might be made either more perfect or else add some startling touch with which the eye of the spectator is bewitched. But up in the booth the projectionist has had to work with machinery which showed little improvement from year to year. While the studio and the laboratory had been working for years to add color or another dimension or sound to the familiar black and white flat film, those responsible for our projection equipment have almost entirely neglected researches in these interesting and financially productive phases, some of which more properly belong to the projection rather than to the producing of films and which could have been brought to a realization more readily by them.

Economic Consideration

It might be that the manufacture of our projection equipment has been concentrated in such few hands as to create very little incentive. It's an economic fact that competition forces the hand of even the most unwilling to make extensive researches to discover new elements of design and new fundamental working principles in order to maintain a financially productive business. It may be that the industry, because of its extreme youth, has not yet attracted the engineering brains of

America to enter into competition to work out its many interesting projection problems. It may be that our equipment manufacturers have fought shy of all constructive suggestion because it would necessitate the scrapping of thousands of dollars worth of jigs and dies and tools and machinery (which act *does* require tremendous courage), although it is an economically sound thing to do when the hand-writing appears on the wall—or even sooner. Ford lost millions of dollars when he finally scrapped his famous *Model T*. He practically replaced all his old factory equipment with new. But he had to do it or else give way to more progressive competition which threatened to take his market away from him.

European Conditions Ideal

European projection equipment is as varied as ours, if not more so. There are

THE views expressed in this article by Mr. Link are interesting but not necessarily the views of this publication. To some extent we are inclined to agree with him. But, on the other hand, we feel that our manufacturers of projection equipment are now trying earnestly to improve the quality and working principles of their product and that the next several years will see a general change all along the line. It is well said that necessity is the mother of invention, and now that the theatres are calling for equipment of the highest grade and quality we feel certain that the matter may well be intrusted to our present enterprising equipment manufacturers.—THE EDITOR.

a variety of projectors, nearly every large country having at least one make of its own. Other pieces of booth equipment are likewise varied. One of the most illuminating experiences is to look through European trade and craft papers and note the optical machinery there displayed. It was my happy experience, for example, to walk into a booth in a distant city one day and find the projectionist intent on the mechanism of an Italian projector which he had especially shipped to him so that he might study it. I cannot say it was very radically different from our own. Yet he pointed out one or two improvements on our own which could be adopted with benefit: the shutter was a radical departure from ours and it seemed very ingenious and scientifically sound.

It is my opinion that American manufacturers have proceeded further than the European, that they have displayed an equal amount of ingenuity, but I also believe that they have not gone far enough.

Research Good Investment

I am of the opinion, for example that there is a vast amount of practically sound theory on projection optics which should be placed by our manufacturers in the hands of their engineers with instructions to use it to improve their product. In this the establishment of real research laboratories would be helpful. This is a phase that has almost wholly been neglected in this country so far as projection equipment goes.

Our largest corporations, such as General Electric, Western Electric, General Motors, Eastman—these have discovered the value of research laboratories and their ultimate economic worth, and out of them have come many of the wonderful things these companies sell for the pleasure or the use of the public. Why not research laboratories to discover better means of lighting, steadier projection, better booth angles, screens of the most definite values, etc. It is not enough to leave to one man the creation of a new idea and to work it out practically. A manufacturer should employ regularly several men and give them the proper tools so that together they might suggest and chew over and criticize and finally bring out real advanced projection equipment.

So much for what I think are some of the improvements those interested in the manufacture of projection equipment might make to improve their product.

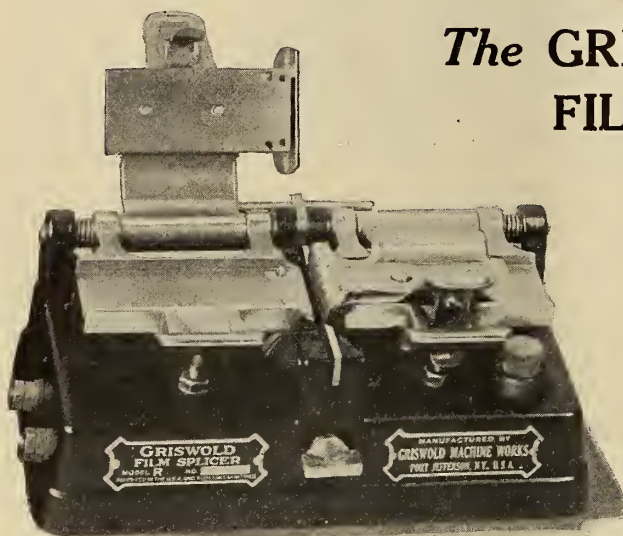
But the greatest force comes from within projectionist ranks. It has been my contention for a long time that the vital ideas which have been incorporated in equipment have come from the men in the booths. In fact there are a number of important manufacturers who have had their product designed by projectionists or else submit their blueprint calculations to projectionists for final approval.

In many of the booths a visitor would be agreeably surprised to find little improvements on the equipment which were devised by the attending projectionists and which were quite in advance of the equipment as supplied to him by the manufacturer. It would take up too much space to record the number and variety of these thoroughly professional devices which are in use today in hundreds of booths all over the country that are not recorded in any patent office and are not on the list of any manufacturer. I have already spoken to a large number of projectionists about the feasibility of compiling a complete list of these gadgets gathered from every booth in the United States and Canada. They are all commercially

(Continued on page 26)

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Changeovers

IN making a change-over from one projector to another there are several things that demand attention at practically the same time.

After starting the motor at the motor cue, the left hand is placed on the douser and the right hand on the fader. It has



Figure
A

From
left to
right

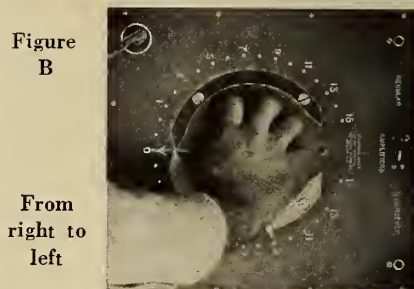


Figure
B

From
right to
left

Showing Correct Fader Operation

happened (and the mistake is a very easy one to make), that the fader handle has been turned the wrong way at the instant of change-over. That is, instead of being thrown over to the projector that is just starting a new reel it has been turned up higher on the projector that is running out; and the assorted noises that resulted had very little, if any, relation to the picture on the screen.

How to Avoid Trouble

This occurrence can be easily guarded against by a method that distracts no attention from watching the change-over cue and makes it virtually impossible to go the wrong way. Assuming that one is shifting from the left projector to the right one, grasp the fader knob with the hand (the right hand being used in all cases), as shown in Figure A. In this position it is easy to turn the fader the correct way and impossible to turn it the wrong way, since the hand is already as far in that direction as it can comfortably go. Similarly, to throw from the right projector to the left one, grasp the fader knob as shown in Figure B, and it will be impossible to go wrong.

This is a simple scheme, but it saves the need for thought at a time when practically the entire attention of the projectionist is demanded in waiting for the cue.

How to Order Parts

By JOHN PROSS

THIS is the last installment, but one, of the series of articles on "How to Order Parts." In this issue is presented the listing of the U and W, the X and the G assemblies and parts. The final installment will treat of the A, B and BB assemblies and parts, the latter being the double-bearing intermittent movement.

Since the start of this series THE MOTION PICTURE PROJECTIONIST has received many comments on the parts listing. Projectionists everywhere welcome the listings as not only enabling them to order needed parts easily and quickly, but also serving as a means of familiarizing them with the function of the various assemblies and their component parts in the daily use of the projector.

Among the many interesting suggestions received was one advocating the substitution of numbers for the key letters, with the projector divided off into six sections. Thus, instead of having to search for the key letter (B, or BB, or X or G), a pro-



John Pross

jectionist would glance at a chart showing the different sections and know immediately

to just what assembly any particular part belonged.

Undoubtedly the number system would be somewhat easier to keep in mind than are the key letters, but the latter are too few to justify the trouble of segregating the various assemblies. Then, too, under the number system there would be a strong probability of confusion arising between the assembly numbers and the section numbers.

With regard to the listing of the U and W parts in this issue, the listings are for the most part self-explanatory. Not a few of the U and the W parts are interchangeable, and it would not matter greatly which guide was used. The X parts lists present no radical departure from the "X" guide letters except in the case of several screws which have "G" and "M" guides.

Questions on any phase of projector parts may be addressed to the Service Department of this publication.

"U" and "W" Assemblies and Parts

| Part No. | Description | Part No. | Description |
|----------|---|----------|---|
| "U" | UPPER MAGAZINE ASSEMBLY 16" (Includes R-4 and R-10). | P-371-W | Plate: Lower Magazine Roller Holder Back Plate. |
| "W" | LOWER MAGAZINE ASSEMBLY 16" (Includes R-4 and R-10). | R-227-C | Roller: Magazine Roller (Mass. Req.) (4). |
| | | S-776-C | Screw: Magazine Holder Plate Fastening Screw (12). |
| | Complete "U" and "W" Sub-Assemblies | | "U" & "W" PARTS |
| | U-1 Magazine Latch Assembly. | | Description |
| L-127-U | Latch: Magazine Latch. | A-134-U | Arm: Upper Magazine Arm. |
| R-146-U | Rivet: Magazine Latch Rivet. | A-135-W | Arm: Lower Magazine Arm. |
| S-421-U | Spring: Magazine Latch Spring. | B-147-U | Bracket: Magazine Hinge Bracket. |
| | U-3 Upper Magazine Shaft Complete. | B-195-W | Bushing: Take-up Shaft Bearing Bushing. |
| L-151-U | Lock: Reel Lock. | C-181-U | Case: Upper Magazine Case. |
| P-211-M | Plunger: Reel Lock Plunger. | C-182-W | Case: Lower Magazine Case. |
| S-345-U | Spring: Reel Lock Plunger Spring. | C-183-U | Cover: Upper Magazine Cover. |
| S-702-U | Shaft: Upper Reel Shaft. | C-184-W | Cover: Lower Magazine Cover. |
| | U-4 Shaft Adjusting Nut Assembly. | C-226-U | Collar: Friction Adjusting Collar. |
| N-149-U | Nut: Adjusting Nut. | C-282-W | Collar: Lower Magazine Collar. |
| S-165-C | Screw: Adjusting Nut Set Screw. | D-121-W | Disc: Take-up Shaft Friction Disc. |
| | U-5 Magazine Hinge Complete, Old Style. | D-122-W | Disc: Take-up Shaft Floating Disc. |
| | W-1 Lower Magazine Roller Holder Assembly. | G-131-U | Glass: Magazine Door Wire Glass. |
| H-124-W | Holder: Lower Magazine Roller Holder. | H-143-U | Hinge: Magazine Hinge. |
| R-160-C | Roller: Magazine Roller, Small (3). | K-106-D | Knob: Magazine Cover Knob (Old Style). |
| R-161-C | Roller: Magazine Roller, Large. | K-132-D | Knob: Magazine Cover Knob. |
| S-485-C | Screw: Magazine Roller Screw (8). | N-132-U | Nut: Magazine Latch Spring Ret. Nut. |
| | W-2 Lower Take-up Shaft Complete, Old Style. | N-135-W | Nut: Wire Glass Retain Plate Nut. |
| | W-5 Take-up Shaft and Collar. | P-160-M | Pin: Magazine Shaft Collar Pin. |
| C-282-W | Collar: Take-up Shaft Collar. | P-234-U | Piece: Latch Distance Piece. |
| L-151-U | Lock: Magazine Reel Shaft Lock. | P-235-U | Pin: Hinge Pin. |
| P-160-M | Pin: Reel Shaft Collar Pin. | P-236-U | Plate: Door Glass Retain Plate. |
| P-211-M | Plunger: Reel Lock Plunger. | P-237-U | Protector: Latch Spring Protector. |
| S-733-W | Screw: Lower Magazine Shaft Collar Fastening Screw. | S-138-E | Screw: Latch Spring Retaining Screw. |
| S-345-W | Spring: Reel Lock Spring. | S-187-W | Screw: Magazine Screw. |
| S-703-W | Shaft: Take-up Shaft. | S-189-W | Screw: Magazine Fastening Screw. |
| | W-6 High Speed Take-up Pulley Assembly. | S-233-G | Screw: Take-up Shaft Bearing Bushing Fastening Screw. |
| P-288-W | Pulley: High Speed Take-up Pulley. | S-233-U | Screw: Cover Knob Retain Screw. |
| P-178-R | Pin: Take-up Pulley Pin (3). | S-331-W | Spring: Friction Spring. |
| | W-7 Low Speed Take-up Pulley Assembly. | S-427-Q | Screw: Wire Glass Retain Plate Screw. |
| P-178-R | Pin: Lower Take-up Pulley Pin. | S-427-G | Screw: Set Screw. |
| P-287-W | Pulley: Lower Take-up Pulley. | S-721-U | Spring: Wire Glass Retain Spring. |
| | W-9 High Speed Chain Take-up Pulley (Includes W-6). | S-733-W | Screw: Lower Magazine Collar Screw. |
| S-759-W | Sprocket: 9 Tooth Take-up Pulley Sprocket. | W-163-W | Washer: Take-up Leather Washer. |
| | W-10 Low Speed Chain Take-up Pulley (Includes W-6). | | "U" & "W" UPPER AND LOWER MAGAZINE COMPLETE 18" |
| S-122-C | Screw: Cover Screw (3). | | Complete Sub-Assemblies same as 16" |
| S-761-W | Sprocket: 27 Tooth Take-up Pulley Sprocket. | C-287-U | Case: 18" Magazine Case (2). |
| | W-11 Chain Take-up Idler Arm and Pulley. | C-288-U | Cover: 18" Magazine Cover (2). |
| A-111-W | Arm: Chain Take-up Idler Arm. | A-141-W | Arm: Lower Magazine Arm. |
| P-113-F | Pin: Cotter Pin. | A-142-U | Arm: Upper Magazine Arm. |
| P-363-W | Pulley: Chain Take-up Idler Arm Pulley. | B-222-U | Bracket: Magazine Hinge Bracket (2). |
| S-372-W | Stud: Idler Arm Stud. | | (Other parts same as 16" Magazines). |
| S-155-R | Screw: Wing Screw. | | FOOT COUNTER ASSEMBLY. |
| W-108-P | Washer: Pulley Washer. | B-208-V | Bracket: Foot Counter Bracket. |
| | W-13 Large Take-up Chain (for 16" Magazines). | C-273-V | Counter: Foot Counter. |
| | W-14 Lower Magazine Roller Holder (Mass. Req.). | D-123-V | Door: Foot Counter Door. |
| B-258-W | Block: Lower Magazine Roller Holder Block, Left. | F-127-V | Flange: Foot Counter Driving Flange. |
| B-259-W | Block: Lower Magazine Roller Holder Block, Right. | G-157-V | Gear: Foot Counter Gear. |
| P-364-W | Plate: Lower Magazine Roller Holder Front Plate, Right. | G-158-V | Gear: Foot Counter Driving Gear. |
| P-370-W | Plate: Lower Magazine Roller Holder Front Plate, Left. | P-125-A | Pin: Foot Counter Driving Pin (2). |
| | | S-399-V | Shaft: Foot Counter Driving Shaft. |
| | | S-600-V | Stud: Foot Counter Gear Stud. |
| | | S-278-A | Screw: Foot Counter Screw (7). |
| | | W-177-W | Wheel: Foot Counter Sprocket Wheel. |
| | | P-153-B | Pin: Foot Counter Sprocket Wheel Pin. |
| | | S-192-U | Screw: Stud Fastening Screw. |

Complete "X" Assembly and Parts

| Part No. | Description | "X" PARTS |
|--|--|--|
| "X" | SPEED CONTROL ASSEMBLY COMPLETE. | Belt: Speed Control Belt. |
| | Complete "X" Sub-Assemblies | Cup: Oil Cup. |
| X-1 | Friction Disc Carrier. | C-204-X Carrier: Starting Mechanism Friction Disc Carrier. |
| X-2 | Friction Disc Carrier and Oil Cups (Includes X-1). | C-211-X Collar: Starting Knob Rod Collar. |
| C-141-X Cup: | Oil Cup. | D-114-X Disc: Starting Mechanism Friction Disc. |
| S-218-L Screw: | Set Screw. | D-131-X Disc: Internal Friction Disc. |
| X-3 | Idler Pulley Carrier. | F-116-X Flange: External Friction Disc Driving Flange. |
| X-4 | Idler Pulley Carrier and Pulley (Includes X-3). | F-119-X Frame: Speed Control Main Frame. |
| P-293-X Pulley: | Idler Pulley. | G-141-X Gear: Speed Adjust. Gear. |
| S-145-X Screw: | Idler Pulley Washer Retain Screw. | K-117-X Knob: Speed Control Knob. |
| S-218-L Screw: | Set Screw. | N-136-X Nut: Friction Spring Nut. |
| W-112-G Washer: | Idler Pulley Retain Washer. | P-247-X Pin: Main Pulley Driving Pin. |
| X-5 | Tension Pulley Carrier. | P-293-X Pulley: Deflecting Pulley. |
| X-7 | External Friction Disc (Includes S-735-X). | P-381-X Pin: Square Rod Pin. |
| D-119-X Disc: | External Friction Disc. | R-153-X Roller: Tension Pulley Carrier Roller. |
| S-474-X Stud: | External Friction Disc Stud. | R-168-X Rod: Square Rod. |
| X-8 | Fibre Friction Disc. | R-206-X Rod: Starting Knob Rod. |
| D-117-X Disc: | Fibre Friction Disc. | R-207-X Rod: Speed Adjusting Knob Rod. |
| P-274-X Plate: | Fibre Friction Disc Retain Plate (2). | S-145-G Screw: Deflecting Pulley Retaining Washer Screw. |
| P-275-X Pinion: | Fibre Friction Disc Pinion. | S-173-X Screw: Square Rod Friction Ret. Spring Screw. |
| R-173-X Rivet: | Fibre Friction Disc Retain Rivet (12). | S-218-L Screw: Speed Control Set Screw. |
| X-10 | Speed Control Main Pulley. | S-437-G Screw: Speed Adjusting Gear Set Screw. |
| X-11 | Main Pulley and Oil Cup. | S-438-M Screw: Set Screw. |
| C-141-X Cup: | Oil Cup. | S-463-X Screw: Driving Flange Set Screw. |
| P-247-X Pin: | Main Pulley Driving Pin (2). | S-467-X Screw: Main Frame Clamp Screw. |
| X-16 | Leather Friction Disc Assembly. | S-469-X Screw: Tension Pulley Carrier Roller Screw. |
| D-126-X Disc: | Friction Disc. | S-735-X Shoe: External Friction Disc Stud Shoe. |
| P-319-X Plate: | Friction Disc Plate (2). | S-470-X Spring: Friction Spring. |
| P-331-X Pinion: | Motor Pinion. | S-471-X Spring: Belt Tension Spring. |
| R-210-X Rivet: | Friction Disc Rivet. | S-472-X Spring: Square Rod Friction Spring. |
| * None of the above are sold separately. | | S-524-X Spring: Starting Rod Friction Spring. |
| | | S-575-X Stud: Speed Control Motor Pinion Stud. |
| | | W-112-G Washer: Deflecting Pulley Ret. Washer. |
| | | W-142-X Washer: Motor Pinion Friction Disc Thrust Washer. |

"G" Assembly and Parts

| Part No. | Description | "G" INSIDE MECHANISM ASSEMBLY |
|-------------------|--|---|
| | Complete "G" Sub-Assemblies | P-368-G Pin: Formica Double Bevel Gear Pin. |
| | | S-550-G Shaft: Vertical Shaft. |
| G-1 | Intermediate Gear and Shaft (Includes G-12). | G-18 Framing Mechanism (New Style) (Includes G-19 and G-20). |
| C-192-G Collar: | Intermediate Shaft Gear Collar. | B-264-G Bracket: Framing Mechanism Support Bracket. |
| G-134-G Gear: | Intermediate Gear No. 1. | F-152-G Flange: Framing Lever Gear Friction Flange. |
| G-135-G Gear: | Intermediate Bevel Gear. | H-196-G Handle: Framing Mechanism Handle. |
| S-145-G Screw: | Intermediate Gear Washer Retain Screw. | K-100-N Knob: Framing Mechanism Fibre Knob. |
| S-442-G Screw: | Intermediate Shaft Retain Collar Set Screw. | N-177-G Nut: Framing Lever Gear Friction Adj. Nut (2). |
| S-444-G Shaft: | Intermediate Shaft. | S-122-C Screw: Framing Mechanism Screw (5). |
| W-140-G Washer: | Intermediate Gear Retain Washer. | S-442-G Screw: Framing Mechanism Set Screw. |
| G-2 | Lower Sprocket Shaft and Gear. | S-773-G Stud: Framing Lever Pivot Stud. |
| G-111-G Gear: | Lower Sprocket Gear. | W-196-G Washer: Framing Lever Gear Friction Washer. |
| S-429-G Shaft: | Lower Sprocket Shaft. | G-19 Framing Mechanism Driving Shaft, Gear and Collar. |
| W-114-G Washer: | Lower Sprocket Shaft Washer. | G-19 Collar: Framing Driving Shaft Collar. |
| G-3 | Framing Slide Arm Assembled (Includes G-7). | G-19 Gear: Framing Mechanism Driving Shaft Gear. |
| P-127-G Pin: | Framing Slide Arm Roller Pin. | P-107-G Pin: Taper Pin (2). |
| R-128-G Roller: | Framing Slide Arm Roller. | S-774-G Shaft: Framing Mechanism Driving Shaft. |
| G-4 | Framing Slide Assembly. | G-20 Framing Lever and Gear. |
| B-106-G Block: | Framing Slide Lever Block. | G-20 Gear: Framing Lever Gear. |
| P-128-G Pin: | Framing Slide Lever Pin. | L-157-G Lever: Framing Lever. |
| S-321-G Slide: | Framing Slide. | A-118-G Arm: Picture Framing Handle Arm. |
| G-5 | Bevel Gear and Shaft. | B-122-G Bracket: Shutter Gear Bracket, old style. |
| C-193-G Collar: | Bevel Gear Collar. | G-112-G Gear: Main Driving Gear. |
| G-115-G Gear: | Bevel Gear. | G-138-G Gear: Bevel Gear No. 3. |
| S-436-G Screw: | Set Screw. | G-139-G Gear: Upper Sprocket Shaft Gear. |
| S-446-G Shaft: | Bevel Gear Drive Shaft. | H-120-G Holder: Governor Lower Link Holder. |
| G-6 | Shutter Gear Bracket Assembly Complete (Includes G-4 and G-5). | H-121-G Holder: Governor Upper Link Holder. |
| B-197-G Bracket: | Shutter Gear Bracket. | L-104-G Lever: Framing Slide Lever. |
| C-316-G Cup: | Oil Cup. | L-107-G Lever: Picture Framing Lever. |
| G-116-G Gear: | Shutter Driving Gear with Broached Hole. | L-112-D Link: Governor Weight Link. |
| G-147-G Gear: | Spiral Gear. | L-114-G Link: Picture Framing Connecting Link. |
| R-120-G Rod: | Framing Slide Guide Rod. | L-115-G Link: Picture Framing Link. |
| S-141-A Screw: | Framing Slide Set Screw. | N-119-G Nut: Picture Framing Lever Pivot Screw Nut. |
| S-437-G Screw: | Bevel Gear Set Screw. | P-169-G Pin: Shutter Gear Bracket Dowel Pin. |
| S-781-G Shaft: | Shutter Shaft. | S-100-E Screw: Pivot Screw. |
| W-105-B Washer: | Spiral Driving Gear Shaft Washer. | S-142-G Screw: Picture Framing Lever Pivot Screw. |
| G-7 | Framing Arm and Shoe Assembly. | S-144-G Screw: Picture Framing Link Screw. |
| A-110-G Arm: | Framing Arm. | S-145-G Screw: Framing Slide Lever Stud Spring Retaining Screw. |
| S-312-G Shoe: | Framing Slide Arm Shoe. | S-151-D Screw: Governor Link Holder Screw. |
| G-12 | Formica Intermediate Gear and Plate Assembly. | S-209-G Screw: Main Driving Gear Retaining Screw. |
| P-334-G Plate: | Formica Intermediate Gear. | S-222-G Screw: Picture Framing Link Screw. |
| S-705-G Screw: | Intermediate Gear Screw (3). | S-223-G Screw: Picture Framing Connecting Link Screw. |
| G-13 | Formica Double Bevel Gear and Flanges. | S-237-G Screw: Shutter Gear Bracket Screw. |
| F-149-G Flange: | Formica Double Bevel Gear External Flange. | S-437-G Screw: Bevel Gear Set Screw. |
| F-150-G Flange: | Formica Double Bevel Gear Internal Flange. | S-305-G Shaft: Upper Sprocket Shaft (Old Style). |
| G-190-G Gear: | Formica Double Bevel Gear. | S-447-G Shaft: Shutter Shaft, old style, 3/8" diameter. |
| P-367-G Pin: | Formica Double Bevel Gear Dowel Pin (2). | S-447-G Shaft: Shutter Shaft, old style, 3/8" diameter, extra long. |
| G-14 | Chain Take-up Main Driving Gear. | S-574-G Shaft: Shutter Shaft, 5/16" diameter. |
| G-119-G Gear: | Chain Take-up Main Driving Gear. | S-574-G Shaft: Shutter Shaft, 5/16" diameter, extra long. |
| S-122-C Screw: | Cover Screw (3). | S-330-G Spring: Framing Slide Lever Spring. |
| S-760-G Sprocket: | 21 Tooth Main Driving Gear Sprocket. | S-341-G Spring: Picture Framing Handle Friction Spring. |
| G-15 | Formica Double Bevel Gear, Flanges and Vertical Shaft Assembled (Includes G-13). | S-357-G Stop: Governor Weight Stop. |
| | | S-369-G Stud: Framing Slide Lever Stud. |
| | | W-106-G Washer: Framing Handle Friction Washer. |
| | | W-112-G Washer: Framing Slide Lever Retain Spring Washer. |
| | | W-124-G Washer: Vertical Shaft Washer No. 1. |
| | | W-125-G Washer: Vertical Shaft Washer No. 2. |

"G" PARTS

Electrical Resistance

(Continued from page 13)

current will pass. With the lever N on contact No. 1 the current will pass through coils A, B, C, and D only; by turning the lever to contact No. 4, two coils, K and L, will be cut out of the circuit; while if the lever is placed on contact No. 5 the current must pass through all the coils or grids before leaving through terminal S.

Rheostats are always marked for the voltage on which they are to be used and for the amount of current they will give at the arc. A rheostat marked "110 volts, 40 to 65 amperes" simply means that, providing it is connected on a 110-volt line, it will give 40 amperes at the arc with the lever on low-contact point and 65 amperes if the lever is placed on high. Two or more rheostats may be connected together in series or multiple, but it is important to note that rheostats must always be connected in series with the arc.

Correct Hook-ups

In Figure 3 is shown two rheostats connected in series with each other and in series with the arc. Figure 4 shows two rheostats connected in multiple with each other and in series with the arc.

Never under any circumstances connect a 110-volt rheostat either singly or in multiple on a 220-volt line, as the coils will be heated above their rated capacity and probably will burn out. However, two



Fig. 4

110-volt rheostats if connected in series with each other may be used on a 220-volt line until such time as a 220-volt rheostat can be obtained.

Where a number of rheostats are connected together in series the resistance in a circuit is equal to the sum of the separate rheostats. Thus, by taking three rheostats that have a resistance of 4, 6, and 10 ohms, respectively, and connecting them in series with each other and in series with the arc, the total resistance from the three would be 4, 6, 10 = 20 ohms.

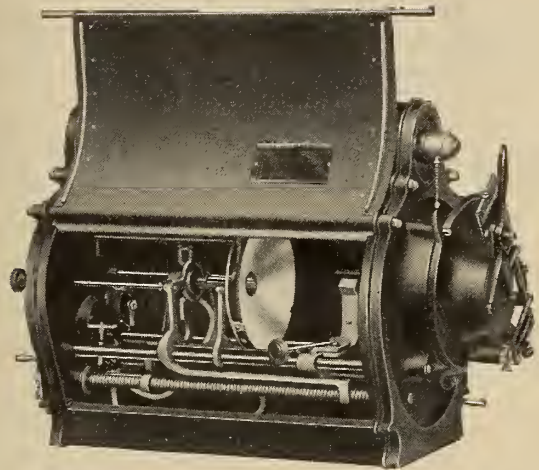
Proper Location

Rheostats should be installed outside the projection room wherever possible, preferably on a shelf near the ceiling and near enough to a vent to allow the heat from the rheostat to be carried to the open air. They should be kept away from anything inflammable. Where the rheostat is located away from the projector it is advisable to have a control switch so placed that the projectionist can cut in or out resistance without having to leave his post. All electric connections should be kept tight to prevent arcing. It is well to remember that copper oxidizes under excessive heat and additional resistance is thus added to the circuit.

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New European Organization

Announcement has been made in several German film trade papers of the formation in that country of a fraternal and protective organization of scenario writers, laboratory technicians, cameramen, studio workers, projectionists, artists and musicians—in short, the banding together of all those who participate in the making and exhibition of motion pictures.

The organization is similar in purpose to the I. A. T. S. E. in this country, but it would obviously be much broader in scope inasmuch as the I. A. does not include as member Locals so many branches of the industry.

With the announcement of this organization in the German papers, many French film papers copied the story and went on to ask, "Why not a similar organization for France?" It is understood that steps have been taken looking to the inclusion in the organization of all motion picture workers in Europe.

That the new organization's way is not altogether smooth may be gleaned from the following account in a German paper of the first meeting:

"The recently formed 'Dachorganisation' is undergoing inward difficulties, although outwardly organized. Those with a sense for detecting basic undercurrents could notice at the initial meeting of the association certain differences which no doubt will lead to further organizing troubles.

"But let us not be alarmed by this fact, as these first differences are rather a necessity than a mistake. For only through arriving at the basic principles constituting the association by a clearing process, will the organization be enabled to be put on a sound footing which is so necessary in waging an active battle for the protection of its members."

N.Y. State Projectionists Elect; Endorse M. P. Projectionist

Paul H. Graf, a member of Local 233, Buffalo, N. Y., was elected President of the Motion Picture Projectionists of New York State at the recent meeting of this association. The Vice-Presidency was conferred on G. H. Robinson of Local 121, Niagara Falls. Glen H. Humphrey, Local 532, Oswego, was named Secretary-Treasurer.

Eddie Stewart of Local 306, New York City, is head of the Executive Board.

The association went on record as officially endorsing THE MOTION PICTURE PROJECTIONIST. This motion was carried without a dissenting voice.

Shutter Blades

In removing shutter blades from Simplex projectors, remove the ten screws S-192-D if the new type of shutter is being used. This will immediately release the shutter blade from the spider.

In replacing the shutter blade, make sure that the word "Simplex" or "Extralite Cutoff Blade" is directly in line with set-screws S-165-D, in shutter spider D-13. Replace screws in respective holes.

Laws and Vagaries of "Hot" Wire Circuits

(Continued from page 8)

To prevent hammering, the exhaust valve of the engine closes before the piston reaches the end of the cylinder so some of the energy of the piston is spent in compressing the remaining steam. An interchange of energy between the steam and piston is constantly taking place so long as the engine is running. The amount or quantity of this energy that is first absorbed by the piston and then returned to the steam is conditioned by the mass of the piston and its maximum speed. It is possible to imagine a piston so heavy that all of the energy of the steam is absorbed during the period of acceleration and none transferred to the machinery.

The Power Factor

Now why all this argument and pother about a steam engine and its working? Because it is often difficult to sense and realize things perceived by the physical eye; how much more difficult is it to acquire a realizing sense of principles seen only with the mind's eye. Many of the properties of electric circuits are disclosed only by a process of analysis and reasoning and the property known as power-factor is one of these. The writer has never heard it said that a steam engine has a power factor, but it does, although it is usually high. But what is power factor?

It is obvious that if the piston of the steam engine were heavy and frictionless, the energy absorbed by it during the period of acceleration would be large and that at least a portion of this would be returned to the steam on the compression stroke. Only a part of the energy supplied by the steam is used in driving the machinery, a part of it is exchanged periodically between the steam and the piston. The percentage of the energy supplied to the piston that is used in driving the machinery can legitimately be called the engine power factor. It is perfectly obvious that the piston never transfers more energy than it receives, and, therefore, its power factor is never greater than 1 or 100 per cent. If all of the energy of the steam were used in accelerating and retarding the piston, then its power factor would be zero, hence power factor ranges from zero to one. One point more before we dismiss the steam engine. The energy that is interchanged between the piston and steam is not wasted and hence power factor is not the same as efficiency. Fig 1 shows a single phase alternator supplying current to a set of lamps, L, through an inductive coil C. Remembering that an alternating current fluctuates when it is zero, no magnetic field exists around the inductive coil, but the magnetic field increases with increase in the current and decreases as the current decreases. This magnetic field is a seat of energy as everyone knows who has been "kicked" by a spark plug. This energy is abstracted from the current as it increases from zero to a maximum value, and then it is returned to

the current as it decreases from its maximum value to zero, etc. There is thus an interchange of energy between the generator and coil C and this energy is not used in lighting the lamps. This energy is not lost, but it is first absorbed by the magnetic field surrounding the coil as the current increases and then it is returned as the current decreases. All of the energy supplied to the circuit consisting of coil and lamps is not utilized in useful work and hence the power factor of the circuit is less than one. This is closely analogous to the power factor of the steam engine explained above.

As power factor is such a ghostly thing to many persons, perhaps another analogy and explanation will be justified. According to definition, power is the product of force and velocity in the direction of the force. Mules pull boats up the Chesapeake & Ohio Canal, but the mule walks on the bank while the boat moves up the middle of the canal. There is thus an angle between the direction of motion of the boat and the force exerted by the mule, or in other words, all of the pull of the mule is not effective in moving the boat forward. The product of the force and the velocity of the boat would not be the power, but this product would have to be multiplied by a factor less than one. This constant is the power factor.

Similarly, power in an electric circuit is measured by the product of the electric pressure, which corresponds to the pull of the mule, and the current which corresponds to the speed of the boat. If these two increase and decrease together then more power is developed than if current lags or leads the pressure as explained in a preceding article. Under such conditions their product must be multiplied by a factor less than one to get the power. This constant which may have any value from 0 to 1 is the power factor of the circuit, and it is the fluctuations of the alternating current that make alternating current calculations more complicated than direct current.

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Mr. Trout Explains Wiring Diagrams

With regard to the comment last month on the wiring diagrams which appeared in the April issue, Mr. Wesley Trout submits the following explanatory note:

Editor MOTION PICTURE PROJECTIONIST: Sir:—Brother Dave Narcey of New York comments on my wiring diagrams which appeared in the April issue, page 26, and says that the hook-up as shown there was incorrect. I wish to state that there was a "shuffle" somewhere along the route between the editorial and pressrooms and the item was mixed up a bit, as is not unusual in cases where diagrams are accompanied by descriptive matter.

The first picture showed how to wire two rheostats (in series and *not* multiple), and rectifier on a *four-pole, double-throw switch*. Of course, the rheostats are to be used only when the rectifier goes "dead" or does not function from some cause; then the projectionist can throw his switches and use the rheostats.

In the next paragraph, below the first picture, there should have been a drawing of how to wire two rheostats in multiple, just as the paragraph reads, and here is where it may have confused some readers, just as it did Mr. Narcey, he thinking that this description referred to the *first* diagram. In some manner, the wiring connecting one rheostat to the other was omitted from the drawing.

The last paragraph and diagram showed how to wire an a-c compensarc and rectifier on an 8-pole, double throw switch. Should the rectifier go "dead," then the projectionist may use the compensarc, or vice versa. I trust this will clear up the misunderstanding.

WESLEY TROUT.

(Mr. Trout is correct in stating that the diagrams as printed differed in one respect from the originals. The drawings as submitted by Mr. Trout were unsuitable for reproduction "as is," and required retouching before engraving. This condition exists in nearly all cases where drawings are not made by a professional artist, an application of India ink being necessary to properly bring out the lines. In this process on Mr. Trout's drawing, a line was not gone over heavily enough to bring it out sufficiently clear for reproduction. We offer our sincere regrets to Mr. Trout for the omission. —THE EDITOR.)

Candlepower

The candlepower in any direction is determined by the brightness of the source, the area of the condensing lens *effective in that direction*, and the transmission factor of the lens.

The size of the light source has an important bearing on the candlepower in any direction (within the limits of the beam), any increase in the first being attended by an increase in the second, and vice versa.

Intermittent Design and Construction

By O. F. SPAHR

Enterprise Optical Manufacturing Co.

OF late years much has been said and written of the advantages of the double-bearing type construction of the intermittent movement. Unquestionably this type of construction embodies distinctly desirable advantages over the once much-heralded single-bearing type of movement.

However, double-bearing types of movements are not a new development, except in design and construction in which much has been accomplished. The very first projectors our company manufactured some twenty-seven years ago were double-bearing types. Our first merely had the star shaft in two bearings which were a part of the main frame casting. The next model we manufactured had the first removable or unit type of movement that was known in motion picture projector design. It was a true double-bearing movement in that the star shaft had a bearing at each end. This type movement is pictured in Figure 1. A few years ago, the double-bearing type of movement was once more exploited (after an interval during which the single-bearing type had held favor). It was put out in different forms for which the manufacturers made many claims.

Double-Bearing Wins Favor

Popular favor again reverting to the double-bearing type of intermittent movement, our company commissioned its engineers to design an intermittent of this type with the instructions, "Make it the best type of double-bearing intermittent movement possible to manufacture." That they have succeeded is evident from the unqualified success of the movement pictured in Figure 2, and which is generally well known both by its name, the De Luxe Double-Bearing Ball-Bearing Intermittent Movement, and the performance it gives. In the illustration, we have photographed what we call a "cut-out model," that you may better see its construction.

In analyzing the requirements for a double-bearing intermittent movement that would measure up to the standard as required in the instructions issued to them, our engineers decided that the following problems would have to be considered: The added friction of the extra star shaft

bearing must be overcome. The cam must be driven direct by the balance wheel shaft without intermediate gearing. The movement and its parts must be of simple construction. Its adjustments must be simple to make and permanent when made. It must be designed for proper and efficient lubrication, and lastly, it must be designed and made of such material as would give the user long and dependable service, rock-steady projection and at low up-keep cost.

Difficult Problems Overcome

The first and perhaps the most important problem was successfully overcome by the use of the ball bearing. Reference to Figure 2 will show this at the end of the star shaft. The star shaft at its end is recessed to form a seat for the bearing ball. The ball, being the same diameter as the shaft, fits correctly in the bearing. By this type of construction, two distinct advantages were obtained. First, the ball bearing eliminated the friction problem encountered in the type of construction where the star shaft was made long enough to extend through the full length of the bearing. Second, it provided a ball bearing end thrust and an end play adjustment of simple form. By means of a hardened steel plunger pressing the ball against the star shaft end, all end play is eliminated. Only one set screw which tightens the plunger need be loosened, the finger pressed against the plunger, the set screw tightened, and the adjustment is completed. Contrast this with the construction where the star shaft extends beyond the bearing and a collar with two set screws is used to make the end play adjustment and which also adds friction to that already encountered in the extra bearing!

The cam of this movement is of one-piece construction; that is, it is formed so that the cam and its shaft is one solid piece of steel. The balance wheel and the driving pinion are mounted directly on the cam shaft so there are no intermediate gears to cause lost motion. The fly-wheel is balanced, and very smooth, vibrationless action is secured.

In the matter of simplicity, the engineers have so worked this out that we feel it is the most simple, sturdy and easily adjusted movement constructed.

Adjustment for the star and cam relation is secured by mak-

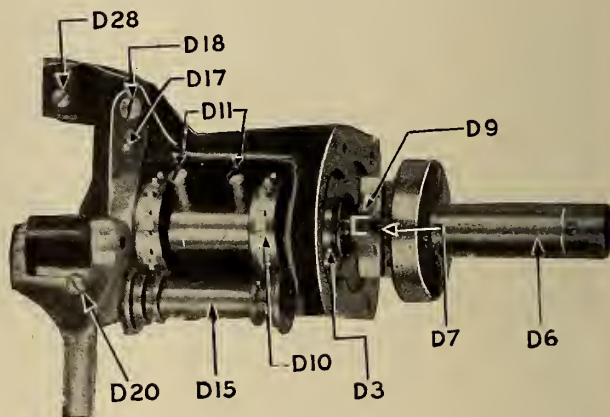


Fig. 2

ing the end of the double-bearing bracket, which carries the star shaft eccentric at that end which enters the movement casing. One locking screw for the eccentric end is loosened and micrometer adjustment secured by the adjusting screws bearing on the double-bearing bracket. One of these screws is visible in Figure 2.

Simplicity Prime Factor

Adjustment of the balance wheel which takes care of end play in the cam shaft is also very simple. Two long screws going through the diameter of the balance wheel and seating on two "flats" on the cam shaft, secure the balance wheel and provide this adjustment. Two locking screws on the side of the wheel permanently lock the long screws in position when the adjustment has been made. Thus the balance wheel must stay in adjustment. To make the adjustment, the small locking screws are loosened, then the two long screws, and a screw-driver inserted between the balance wheel and the knurled retaining screws on the end of the cam shaft. A gentle prying movement of the screw-driver draws the cam shaft and takes up the end play. The screws are then again tightened and the adjustment completed.

In the matter of lubrication, the engineers have also very efficiently worked out their problem. The movement is lubricated with a semi-solid grease injected in the movement casing through a hole provided with a grease plug, a grease gun being furnished with all equipment for this purpose. One filling will lubricate the movement for a week or ten days' usage. Special grooves are machined in the star and cam shaft which draw the lubricant into the bearings and as well force all surplus back into the movement casing. Lubricant cannot work out to the sprocket or film.

Stability and Economy Factors

Last, the engineers gave serious consideration to the end of securing long wear
(Continued on page 26)

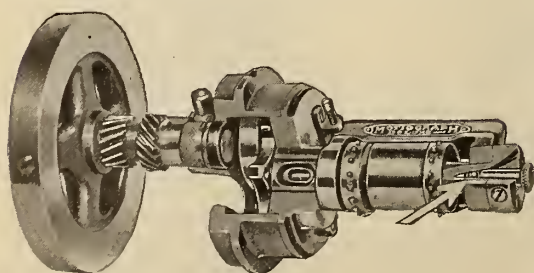


Fig. 1

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Intermittent Design

(Continued from page 24)

and incidentally low up-keep cost for the user. A special hardening and tempering process was evolved whereby the cam, star and sprocket of this movement are hardened and tempered. The parts are then accurately ground to an almost unbelievable degree of accuracy. The design of the parts themselves was worked out to secure maximum wear and to maintain their accuracy—all of which insure that essential requirement—rock-steady projection.

Note particularly the construction of the star. This is clearly shown in the illustration Figure 2. Here we find what is called a "web construction" in that the back of the star slot is reinforced with a web. Any thinking projectionist will readily realize that this means long life for the star as it strengthens the points—the weakest part. The star also is of one-piece construction.

In finish the movement is comparable with the excellence of its performance and the engineering skill evidenced in its design and construction.

Future of Projection

(Continued from page 17)

feasable and most of them would be financially profitable.

I do not hesitate to say that it will not be long before projectionists will begin to show the professional engineers cards and spades on sound-picture equipment. I am sure that before long sound-picture equipment will undergo important changes on the advice and insistence of the projectionists who use it. This is a natural turn of events. Who can be so familiar with the limitations and possibilities of this new device as the man in the booth who uses it daily and has to put up with its obvious defects and who is the first to encourage an improvement that will render more efficient and more dependable service and better screen effects? Laboratory work is sound and necessary—but for exhaustive testing nothing can compare with the thousands of booths using an instrument daily, each projectionist worrying to overcome handicaps.

Modern Projection Demands

Projection today requires a degree of ingenuity, resourcefulness, intelligence, willingness and concentration not hitherto asked of the man in the booth. His work requires the highest skill and the most careful precision. And projectionists all over the country possess these very elements so necessary today. They get the utmost out of the equipment that is supplied them and are prepared by temperament to get much more.

My message is that each manufacturer work out some plan whereby he can keep in intimate touch with the projectionists of his territory or even farther afield. It will stimulate interest and give us projection that will be unbeatable anywhere in the world.

Convention Thoughts

It rained almost all the time.

It caused the daily postponement of the baseball game. Every Delegate had a ticket presented to him by the two Detroit Locals.

Finally they went to a fight instead.

After a while it was discovered that eighty-five ladies had accompanied their husbands to the Convention.

Again the two Detroit Locals pitched in and arranged entertainment for them.

But the Delegates did not want for entertainment. Everybody says it was a great time—the finest convention of all.

Each evening the hotel buzzed with numerous caucases.

Any baths that were taken were shower baths. The bathtubs were always full.

On account of the Convention the Detroit River experienced the biggest traffic congestion in years. Because of the boats that plied between Windsor and Detroit.

The third was also popular.

Anyone knowing the whereabouts of a banjo will please inform the Tuller. The owner is probably still looking for it.

There were some fine displays. Brenkert with its new effect projector, Chicago Cinema with its new Goldberg spot, Sentry Safety; International Projector with its new flexible base, etc.

And who will forget the party Brenkert threw at their factory.

A Convention is useful for many things.

It gives the boys a chance to meet others from different parts of the country. It forms interesting and useful friendships.

One got an impression of tremendous power and vitality in the International Alliance.

The staff of the International offices in the Florence Room should be commended for their courtesy and willingness to cooperate with everybody. The young ladies were all smiles, although the work must have been arduous and exacting.

Anyway Detroit knows it had a real Convention.

Every Delegate attended strictly to business. Play time was playtime but the Convention meetings were strictly attended to. Every Local gained by sending the Delegate it did.

Detroit has more automobiles than any other city in the U. S.—I think. But thank God, its traffic system is so good.

Dick Green was so happy! The Convention loved him when he got up on the platform but was overcome with feeling, that he wasn't able to orate. But he is a great doer!

Incidentally, what a fine lot all the International officers are. They make a splendid appearance on the platform. All good looking and evidently very capable.

Canavan often looked tired. But his mind worked like lightning. He had a ready answer to any question no matter how seemingly involved. And wit a-plenty.

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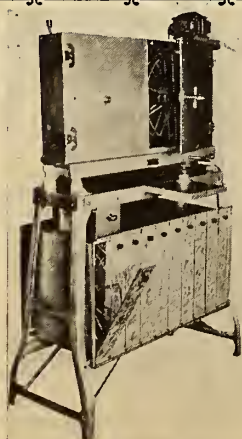
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About Lenses

By DR. F. KOLLMORGEN

THE other day the writer had a rather interesting letter from a client who had requested one of our new Solex lenses for comparative test. The letter concerned a subject that should prove of general interest to all projectionists, thus the offer to set down the facts in the matter for publication in this paper was gladly accepted, so that the points stressed might be given general circulation.

My correspondent wrote that, while for sharpness of definition and brilliancy the Solex lens was very superior, he had noticed that it gave somewhat less light than another make of lens. This puzzled the writer very much, as he, together with an impartial optical expert, had made a series of photometric tests on that identical make of lens as compared with the Solex of the same focus and had found practically no difference in the results obtained. However, there are no mysteries in optics, and so after some study the explanation of this situation was found.

If one should look at the cone of light coming from the reflector of an arc lamp toward the aperture plate, one would see that this cone narrows to its minimum diameter and then slowly spreads. The other lens referred to above is of very long build and has a positive lens at the rear, close to the aperture plate, so that the diverging cone is bent toward the front lens and fills this completely when the reflector is focused approximately upon the aperture plate.

If a Solex lens or a Snaplite, or any other lens of short build, is used with the same setting of arc and reflector, the front lens of these will not be completely filled so that the lens is not used to its full capacity. If, however, the reflector is moved very slightly so as to make the spot a little smaller, the light rays will run correctly and fill the entire front lens, and a very considerable increase in illumination is noted immediately.

Take a piece of ordinary smooth writing paper and, having set your lens to focus on the screen without any film in the aperture, hold the piece of paper in front of the lens. You will see the black spot caused by the carbon surrounded by light. Then adjust the mirror and immediately see the distribution of light on the white paper change.

After a few seconds' trial a position will be found in which the circle of light is the same diameter as the free opening of the front lens, and quite evenly illuminated. This is the position in which the lens will give the maximum illumination.

When this has been reached the carbons may have to be moved somewhat, so as to displace the black spot from the center. With the lamp that is used in our lens tests, we find that the greatest amount of illumination is obtained when the black spot is slightly above the center. This is probably due to the fact that the intensity of the arc varies in its different zones.



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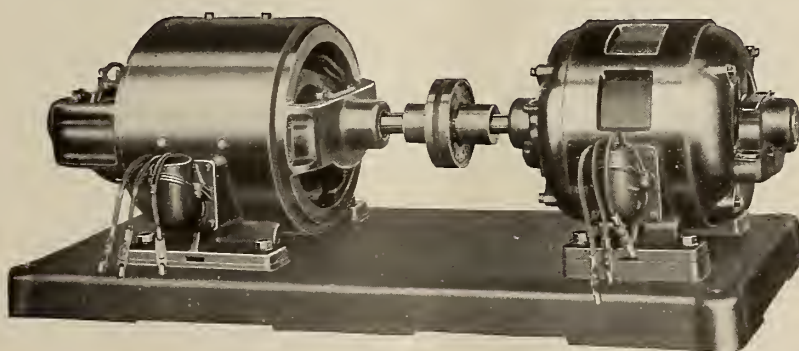


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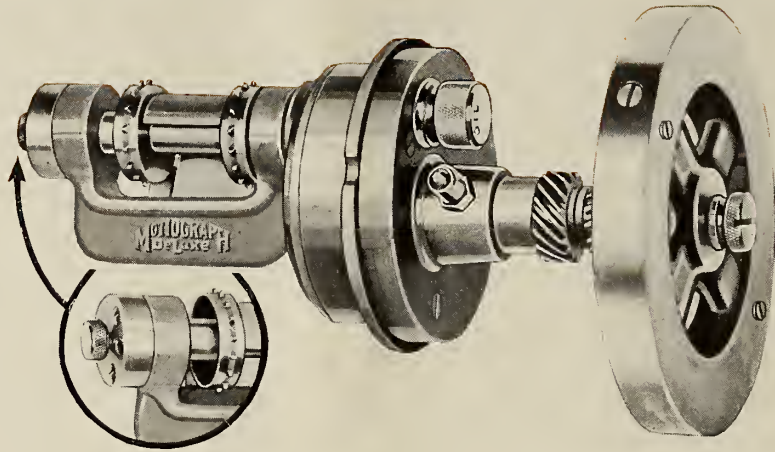
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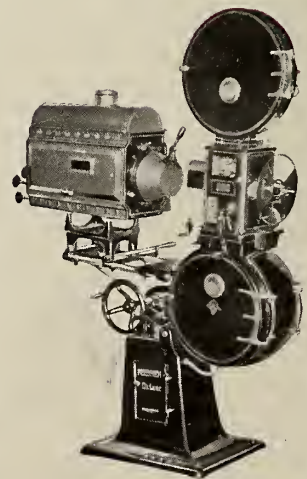
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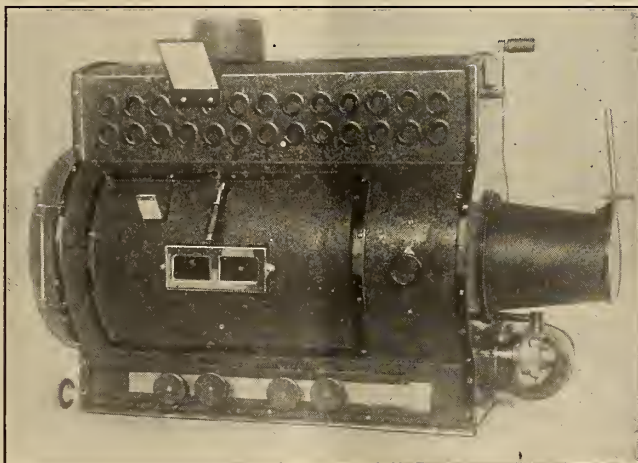
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More "Talkies"

SEVERAL recent entries in the "talkie" derby bring the number already in the field up to eight. This does not include those devices which are as yet in the preparatory stage and concerning which there is little, if any, information available.

Into the field already comfortably filled by Vitaphone, Movietone, Photophone and Vocafilm there have come during the past two months Hannaphone, Bristolphone, Cinephone and Cortellaphone. Three out of four of these newcomers stress moderate prices for both installation and operation as their primary advantages, but the fourth insists that it just is a better device without regard to price.

Only one of the new entrants, the Cinephone, offers both the film and disc methods. The other three are all disc propositions.

Photophone's First Showing

Of the original entrants in the sound picture field Vocafilm has been the least active to date. It is understood that experiments are being conducted looking toward the correction of several defects which manifested themselves at the initial showing last year. Vitaphone and Movietone are, of course, forging ahead rapidly, with new installations being reported every day. The Photophone, which is being marketed by RCA, has been demonstrated frequently of late, and the first public showing of the device was held at a New York theatre on July 7, when "King of Kings" was offered with a Photophone score.

With the start of the Fall selling season the various sound picture devices are expected to be classified according to their respective advantages—quality, installation and upkeep costs, attractions available—and the selling issues on each are expected to be very clearly defined.

Litigation Rampant

As is usual in a new field, the sound picture business has run true to form in that the intense competition has provoked not a little litigation. Several lawsuits are now pending which are assumed to have the not too easy task of allotting to the respective claimants their just dues.

When the smoke of battle of litigation has drifted away, it is expected that the field will be narrowed down to about three leading contenders, with a scattering of independent operators who will strive for the small-house business on the price basis alone.

The Watt

The electrical unit of power is the watt, and is equal to one joule per second—that is, when one joule of work is expended in one second, the power is one watt. If the number of joules expended in a certain time is known, then the power in watts is obtained by dividing the number of joules by the time in seconds.

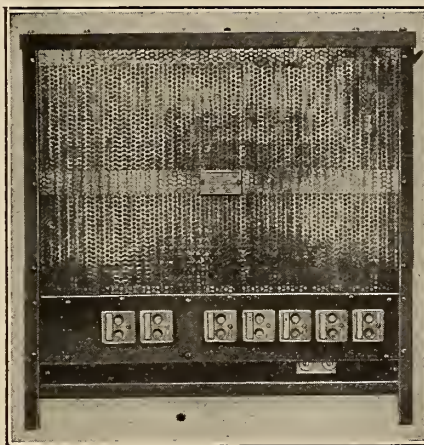
The power is obtained by multiplying the current by the voltage, or by multiplying the square of the current by the resistance. The watt is sometimes called the *voltampere*.

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(4136)

National Theatre Supply Company

Offices in all
Principal Cities

New Model F-7 Brenograph

By J. H. KURLANDER

Engineer, Brenkert Light Projection Co.

THE new F-7 Master Brenograph employs principles of projection which are altogether different from any now used in moving picture equipment. The machine, after being placed in the projection room, is never moved, but is merely placed behind the proper porthole in a permanent fashion. In spite of the fact that the machine remains absolutely stationary, any object, or surface, at the front of the theatre which can be seen from the port opening, can be instantly covered by either of the projecting systems.

This flexible control is obtained by means of flat directional mirrors, a set of three being placed in front of the projection lens in each system. (Fig. 1.) These mirrors are of the highest grade, optically, and were selected only after extended testing conclusively proved them to be suitable in every respect. One mirror in each set is rigidly fixed in position before the projection lens and is used only to divert the light beam onto one or the other of the remaining two mirrors. Two

THE Brenkert Light Projection Company of Detroit, Michigan, have added to their already extensive line of projection room equipment an outstanding piece of projection apparatus in the form of a universal effect projector. This device, which will be known as the Model F-7 Master Brenograph, was exhibited for the first time at the 29th Convention of the I. A. T. S. E. held recently in Detroit, where it proved to be the center of attraction and aroused considerable interest.

mirrors in each set are mounted side by side on a sliding cross rod which permits either to be instantly placed in the path of the light beam. Both of them are adjustable vertically and horizontally, so that the beam received upon the surface of

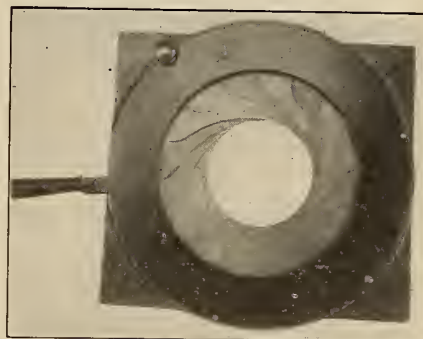


Fig. 2. Pre-set iris shutter which is adjusted to size while in the projector, then locked into position and removed for future use.

each can be reflected to any part of the house merely by turning two small knobs.

Focus by Moving Lamphouses

Both of the movable mirrors in each system can be locked in position after they are adjusted so that it is possible, in this manner, to preset each system for either slides or effects without in any way disturbing any of the other settings. Since two duplicate projecting systems are available, it is possible to show a total of four preset effects, changing from one to the other at will, instantly.

Immediately behind the directional mirrors are mounted four projection lenses, each four inches in diameter and graded in focal length from 10" to 40" which gives the projectionist a wide range over which to work. These lenses are mounted in a swivel assembly to facilitate rapid selection for meeting the conditions at hand.

In front of the respective lens assemblies is mounted an iris shutter controlled by a rapid operating change-over handle for showing dissolving lantern slides. An effect holder in each system completes the equipment at the front end of the machine, all this being mounted rigidly in place as it is not required to move the lens assemblies back and forth to obtain a focus.

For focussing purposes, the lamphouse in each system, together with its related parts such as the holders, shutters, slide carrier, etc., is moved back and forth along the supporting base rods by means of a rack and pinion arrangement. Preset focussing indicators are supported along the path of each lamphouse, one for each projection lens, so that focussing can be accomplished without actually observing the screen.

All Shutters Removable and Preset

Instead of building the various framing and iris shutters into a fixed assembly as was done in the old Brenkert F-3 models, the much simpler method has been adopted of constructing each shutter as a

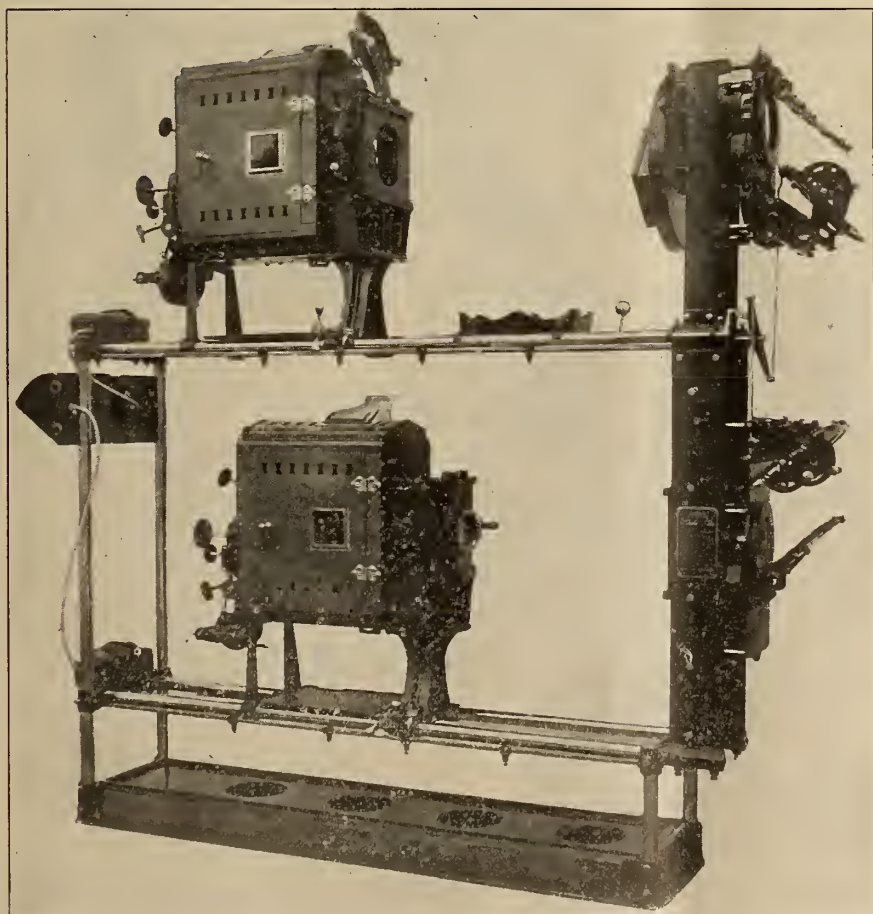


Fig. 1. The Brenkert F-7 Master Brenograph. A universal effect projector completely equipped with pre-set adjustments.

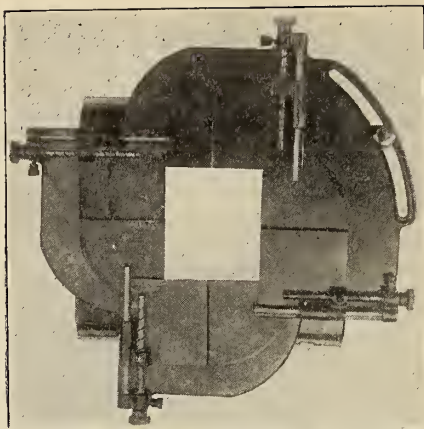


Fig. 3. Pre-set framing shutter each blade of which can be adjusted separately and then locked into position. The entire shutter assembly can be swiveled to correct distortion resulting from side projection.

separate device which can be locked for any desired adjustment and then removed from the machine to be laid aside until it is used. Thus, the iris shutter (Fig. 2), is a separate device which can be adjusted for size, locked in position and then removed until the time comes when it will be used. So also with the single unit framing shutter (Fig. 3), which has four blades (two for horizontal and two for vertical framing) each of which can be separately adjusted and locked into position.

Additional accessories of this nature include a removable photographic plate holder (Fig. 4), for the use of 4 x 5-inch plates on which are printed various effects; an adjustable star shutter (Fig. 5), also removable; screen masks, and glass effect plates measuring 6 x 8 inches for color effects. The effect plates are all especially moulded to order and contain distinctive patterns.

Presetting of Effects is Feature

A hinged slide carrier is mounted on the holder assembly so that it can be swung out of the way when slides are not being projected. All plate and effect holders are provided with swivel adjustments to correct distortion when the beam is projected to one side of the machine.

The entire idea of this new effect projector centers around the point of presetting all effects in advance of their showing. All adjustments for slides and effects, including framing, focussing, directing the beam, matching, etc., are performed in advance so that it is not necessary to disturb any adjustment when changing from slides to effects or from one effect to another.

Both projecting systems are absolutely independent of each other, which makes it possible to show a small picture with one system while the other is projecting a large one. What is more important, the two independent light beams can be directed to different parts of the theatre so that it is possible to "spot" the organist at the same time that an effect is being thrown upon the screen; or, two effects can be projected to opposite sides of the theatre. The angles over which the beams may be thrown are as follows: 16 degrees above horizontal, 40 degrees below horizontal, and 26 degrees to the left or right of the machine (see Fig. 6). The

machine is never tilted and at all times remains level on the floor.

Greatly Increased Efficiency

While the Master Brenograph has the same over-all dimensions as the old Model F-3 machine, it actually requires less space in the projection room, because no space is required, as with the old model, for side swiveling and tilting to make the beams cover the stage.

In point of light efficiency, too, the Master Brenograph is far superior even though additional losses of light are encountered by using the directional mirrors. A highly efficient condenser set together

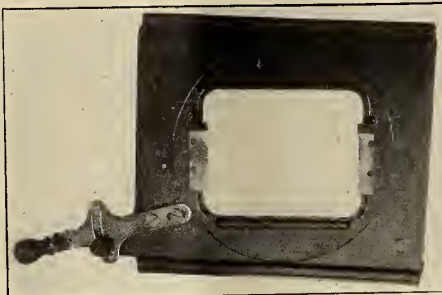


Fig. 4. Photographic plate holder for the projection of effect designs over the entire stage opening.

with large diameter projection lenses, give the brilliant light that is required to project rich color effects. The current neces-

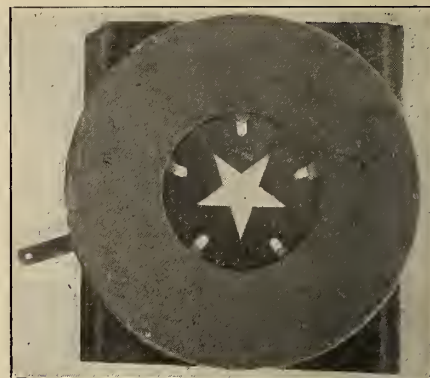
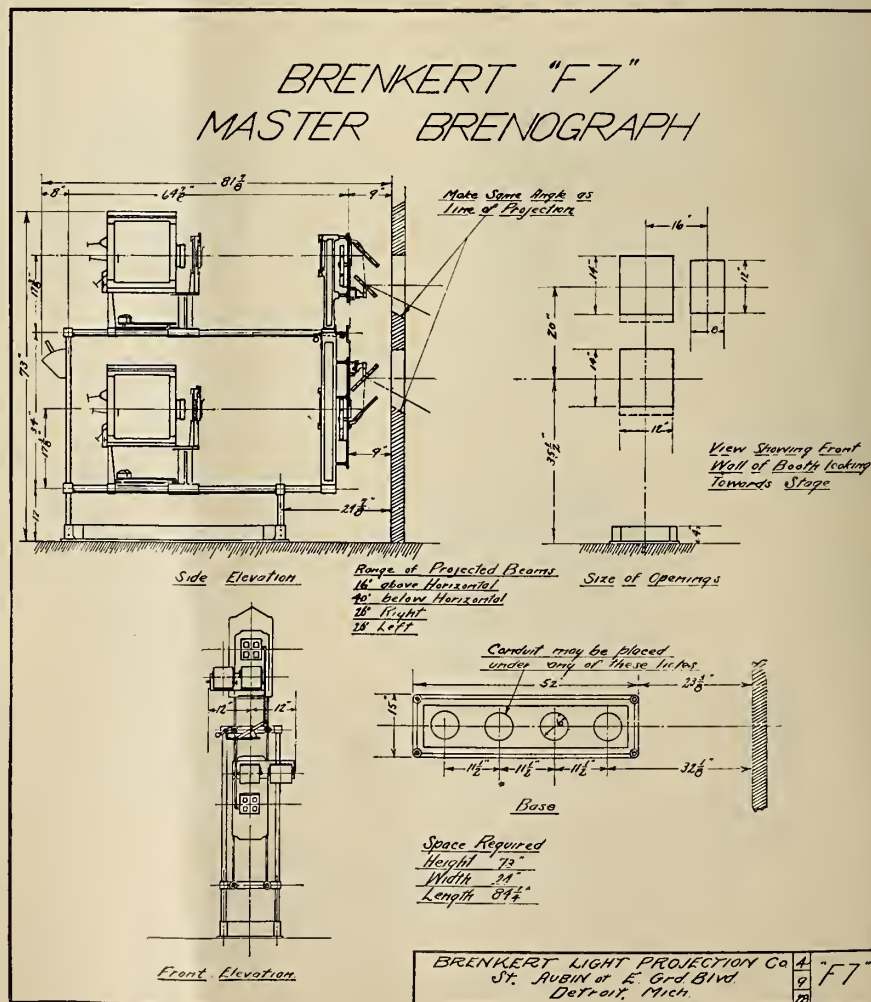


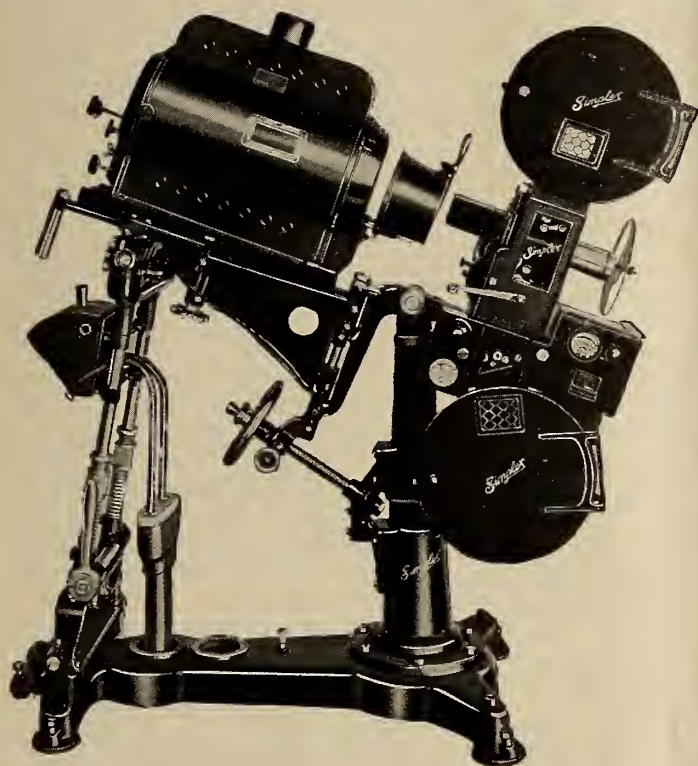
Fig. 5. Adjustable star shutter for special masking and effect work.

sary to obtain this light is moderate; in fact, 60 amperes represent the maximum which can be used to good advantage, but it is expected that 40 to 50 amperes will suffice for all ordinary work even in the large theatres.

The practicability of the Master Brenograph has been amply demonstrated by thorough laboratory tests supplemented by daily operation over a period of months in Detroit's largest and most beautiful theatre, The Hollywood. The extreme flexibility of the machine and its precise registration of every effect immediately won for it the admiration of the owners and projectionists alike, with the result
(Continued on page 32)



MOVIETONE EQUIPPED MEANS SIMPLEX EQUIPPED IN AMERICA'S LEADING THEATRES



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Care of Storage Batteries

By JOHN MCGUINNESS
The Electric Storage Battery Co.

A STORAGE battery is simply a device which may be used repeatedly for storing energy at one time for use at another. Energy is put into it in the form of direct electrical current and delivered from it in the same form. The process of putting energy into the battery is termed "charging." When the battery is delivering energy, it is "discharging."

In a storage battery there are positive plates and negative plates which are insulated from each other by thin pieces of wood or rubber called "separators." In the lead acid battery, which is almost universally used, the positive and negative plates are both made of lead. The active part of the positive plates is in the form of lead peroxide, and of the negative plates is pure spongy metallic lead. Plates of like polarity are assembled in groups.

The capacity of the battery varies as the total active plate surface, the more surface the greater the capacity. These groups and the separators are immersed in a dilute solution of sulphuric acid called "electrolyte."

Chemical Reactions

On discharge, a chemical reaction takes place in the battery causing current to flow out of one set of plates through the circuit and back again into the plates of opposite polarity. In this chemical reaction, the sulphuric acid of the electrolyte

STORAGE batteries are a vital part of the projection equipment for sound pictures, hence a knowledge of their functions and the proper care necessary to insure the best operating results is essential to the sound-picture projectionist. The accompanying article on storage batteries and their care was prepared by Mr. John McGuinness, of The Electric Storage Battery Co. Mr. McGuinness is an acknowledged authority in his field and his article on storage batteries, with special emphasis on their application to projection work, should prove particularly interesting to projectionists. Requests for further information on storage batteries are solicited and should be addressed to the Service Dept. of THE MOTION PICTURE PROJECTIONIST.

reacts on both positive and negative plates to form lead sulphate in both. When the sulphuric acid in the electrolyte has reacted on all of the available lead peroxide of the positive plates and on all of the available pure lead in the negative plates, the chemical action ceases and the electric discharge stops. We say then that the battery is completely discharged. In actual operation, however, the discharge is always stopped before this complete discharge occurs.

When the battery is charged, the sulphuric acid which has combined with

both plates during discharge is driven out of these plates back into the electrolyte. If the charge is continued long enough, we again have the positive plates in the form of lead peroxide and the negative plates in the form of pure lead.

We have, therefore, a reversible chemical reaction in the battery which allows us to alternately charge and discharge it. A complete discharge and charge are together termed a "cycle."

Inasmuch as the electrolyte used is a mixture of sulphuric acid and water, the specific gravity of this electrolyte will depend upon the quantity of sulphuric acid in it. Pure commercial sulphuric acid has a specific gravity of 1.835, water being taken as 1.000. The pure acid is, therefore, heavier than water.

Specific Gravity

Because of the fact that on discharge the sulphuric acid in the electrolyte combines with the battery plates, the amount of sulphuric acid in the electrolyte is reduced. It follows that on discharge the specific gravity of the electrolyte decreases proportionately as the sulphuric acid is used up and the resultant mixture more nearly approaches water.

A specific gravity reading is, therefore, a measure of the amount of sulphuric acid which has combined chemically with the battery plates and hence a measure of the amount of discharge which has taken place. Conversely, in charging, the specific gravity of the electrolyte rises as the sulphuric acid, in the form of lead sulphate, is driven out of the battery plates. When the specific gravity cannot be raised any further, it is an indication that we have driven out of the plates all of the sulphuric acid which has reacted upon them. In other words, the battery is charged.

In operating storage batteries a few points should be understood as to their care. If these few simple directions are followed, long life will be obtained from the battery and battery troubles will be eliminated. The principal points to be kept in mind follow.

Keep the Outside of the Battery Clean and Dry

Dampness and dirt permit the electric current to leak away and leakage may cause noise in the amplifiers. In time, wood battery cases will become rotted and the terminals become corroded.

Keep the vent plugs (see Fig. 6) in place at all times, except when taking a specific gravity reading or when adding water.

If acid is spilled or the battery is damp with acid, apply a small amount of dilute solution of ammonia or baking soda and

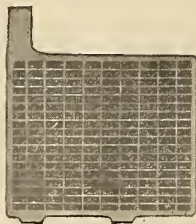


Fig. 1.—Positive Plate



Fig. 2.—Negative Plate



Fig. 3.—Negative Group

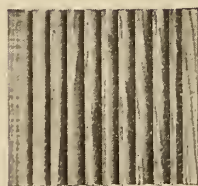


Fig. 4.—Wood Separator



Fig. 5.—Positive Group

water, which will neutralize the acid. Then rinse the battery with water and dry. Do not allow this ammonia or soda solution to get into the battery cells.

Keep Terminals Clean and Tight

Sometimes a deposit will form on the terminals of the battery. Remove this with weak ammonia or soda solution and scrape the metal clean. Then cover the terminals with a thin coating of vaseline to prevent further corrosion. Keep all terminals tight, as a single poor connection may result in much amplifier noise.

Add Water to Cells Regularly

The water in many cities is satisfactory for adding to the battery. However, use distilled water if there is any doubt. Never allow the surface of the electrolyte to drop below the tops of the plate. Add water when needed until the level of the electrolyte in rubber jar cells is just below the bottom of the filling tube. In glass jar cells, fill to the waterline.

To let the electrolyte fall below the tops of the plates allows just that much of the plates to dry out. That part of the plates which has been allowed to become dry becomes inactive in the chemical reaction. In other words, the capacity of the battery will be reduced in proportion to the amount of plate surface which has been allowed to dry out. It can be converted into active plate surface again only through elaborate treatment. There is also a permanent deterioration of that part of the plates which has dried out.

Add water just before charging. This allows the water to mix thoroughly with the electrolyte during the charge, as there is always some bubbling or gassing during charge. Do *not* add water just before or during use in a show.

Keep Flames Away

It is very important that all open flames be kept away from the battery, particularly while charging. Use an electric flashlight. Hydrogen gas is given off by the battery in charging and certain mixtures of hydrogen gas and air are highly explosive.

Careful Hydrometer Readings

In taking specific gravity readings with a hydrometer syringe there are a few points to keep in mind. Draw into the syringe sufficient electrolyte to float the hydrometer in the syringe clear of the soft rubber stopper in the bottom, but do *not* draw in enough electrolyte to allow the stem of the hydrometer to touch the top of the syringe.

Release all pressure on the rubber bulb when reading. If the level of the electrolyte is too low to obtain sufficient electrolyte to float the hydrometer bulb, add water to the battery; but do not take a specific gravity reading until this water has been mixed by charging.

Avoid Over-discharging

It has been explained that on discharge lead sulphate was formed in both positive and negative plates. Lead sulphate occupies more volume than either the lead peroxide of the charged positive plates or the pure lead of the negative plates. Provi-

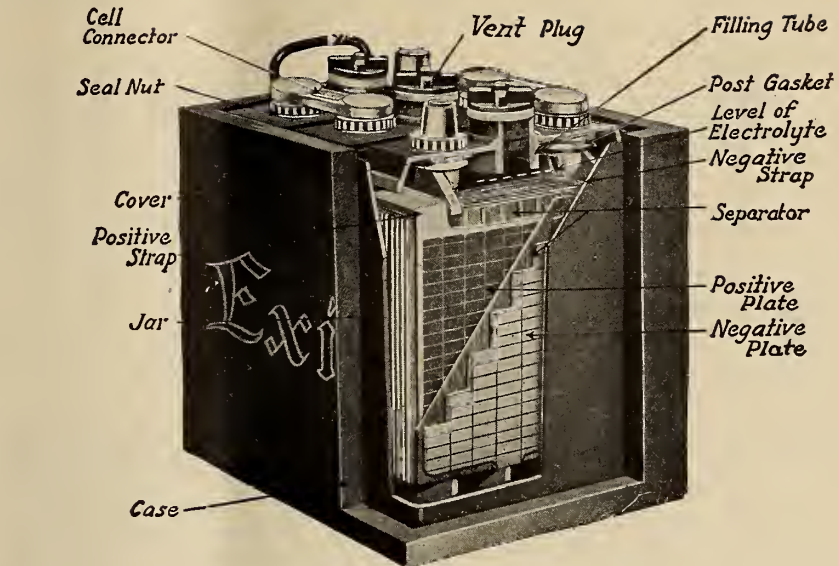


Fig. 6.—Sectional view of battery, showing construction

sion has been made in the plates for taking care of a certain amount of this expansion. If, however, the discharge is carried too far, the plates will be permanently injured and their life shortened.

Do Not Let a Battery Remain in a Discharged Condition

Lead sulphate, which is formed in both plates on discharge, hardens in the plates if allowed to stand in this condition for any length of time. If this lead sulphate becomes hard, it is difficult to drive the acid out of the plates and back into the electrolyte again by charging. This condition is what is commonly known as "sulphated battery."

If the charging current is maintained too high, especially toward the end of the charge, there will be overheating, which may char the separators and injure the plates.

Do Not Overcharge

Do not overcharge repeatedly. Continuing the charge after a hydrometer reading shows that the battery is fully charged, will weaken the plate structure and in time will result in cracked positive plates. This results in decreased capacity and possible internal trouble from short circuit.

Courtesy Fox-Case Corp. and the author.

Complaint Department

COMPLAINTS on which action has been taken by THE MOTION PICTURE PROJECTIONIST during the past month numbered two. From South Bend, Indiana, the projectionist at a second-run house submitted the following complaint:

Complaint Dept.,
M. P. PROJECTIONIST.

Sir:—Enclosed herewith please find some patches which were clipped recently from a First National film. The initial of the inspector of this film is plainly indicated on the inspection tag attached. The fault for the very bad condition of these samples evidently lies with some projectionist, for the majority of these bad splices occurred at the end of reels.

While not denying the fault of the projectionist in this case, how would one explain the reason for this film passing the inspector who so brazenly attached his initials to the inspection report when passing it through? I have read many reports on film conditions which are turned out by well-paid representatives of the various film companies, but I have yet to see one of these reports which gave the projectionist any sort of an "even break." That is, all these propagandists imply that the fault for bad film conditions lies 85% with the projectionist and 15% with the exchange. This is, of course, a gross exaggeration.

The projectionist is the goat for all

the abuse that accrues from damaged prints, but this one sample of poor inspection speaks volumes regarding the real reason for a majority of the bad film.

Indicating that our Mid-Western subscribers are more sensitive to bad film is another complaint from Great Bend, Kansas, where the projectionist, while reserving comment on the blame for bad film, is very specific in his complaint. His letter follows:

Sir:—The following is the condition of a new print we received from the Paramount Lasky Corp.:

Title—"Under the Tonto Rim."

Production No. 2745, from Kansas City Branch.

- (1) Leader piece for Reel 2 on end of reel 4.
- (2) Reel bands not on proper reels.
- (3) One frame burned out about three feet in on Reel 4.
- (4) Misframe and torn patch about 20 ft. from end of Reel 4.
- (5) One patch made with steel clip.

If your Complaint Dept. is able to help us boys in this matter of bad film, we certainly will appreciate it a whole lot. Ordinarily, all we could do would be to complain to the exchange, and all of us know the futility of doing that. Now

(Continued on page 28)

As The EDITOR Sees It

T ¶ *Feverish "Talkie" Activity*

THE air is filled with synchronized picture talk. Nothing else interests the industry today but the question of sound pictures. Cecil B. De Mille has said that sound pictures will make or break the industry. Sid Grauman, noted West coast exhibitor, has said that sound pictures will make the industry. There are many other opinions. But the fact is that all the big producing companies, and not a few smaller units, are tied up with some talking device and are making preparations in their studios to make many talking films. Regardless of what may be said pro or con, it looks as though talking pictures will play a big part for the next several seasons. These several seasons will tell the tale. Either talking films will become permanent and a part of every theatre program, or they will begin to pass out gradually as an unsuccessful experiment. This paper believes that they are here to stay. Everything points in this direction. For one thing, it is a known fact that the quality of pictures has been steadily declining during the past five years. Something evil has gotten into the business of producing pictures. Except for a few outstanding films each season, the bulk of the pictures were not only poor entertainment but were produced under the most wasteful economic methods—methods not justified by the results. The public were complaining audibly and each season becoming more and more disappointed at what they saw on the screens. Something was needed at once to bring back this lagging interest and to keep the motion picture industry among the big industries of the nation. Talking pictures seems to be the necessary corrective.

T ¶ *Huge Development Program*

THE producers are backed by unlimited resources. Once they see a possibility in this new element they are not going to give up easily. They will help to further its progress and will turn their studios over to the production of suitable sound feature films. From the angle of those new companies that have stepped into the industry with talking devices, their permanency seems to be even more assured. The Radio Corporation of America, with which is associated the General Electric Company, and the connection between Western Electric Company and the Bell Laboratories, has resulted in the spending of huge sums to bring the sound picture device to a state of perfection. These companies have placed the best engineers on the job and nothing is being spared to hasten the development of the various devices. These companies are prepared to spend several years more in experimentation, if necessary, but it cannot be doubted that they will finally bring out one or more near-perfect devices that will delight picture audiences. All these companies see potential fat returns in marketing sound picture devices and they are not going to give up easily. As a matter of fact, several of these devices are already in an advanced state bordering on perfection. Movietone and Vitaphone being the earliest in the field have progressed farthest. Either one of these devices, for instance, can record a single sound, voice or instrument, with perfection. It is only when they blend sounds together—that is, a chorus of voices or an orchestra—that they lose distinction and sound metallic.

What these devices need is a greater refinement in reproducing the sound. And this will soon be accomplished.

A ¶ *Projectionist Responsibility*

AND so a new day has dawned for the craft. For no other phase of the motion picture industry is more vitally concerned with talking pictures as the projectionist. Regardless of the attitudes of others, we know that he is the man most concerned. The whole delicate machinery is in his hands; and the exhibitor, the public, the sponsors of sound picture devices and their engineers must wait upon him and depend upon him to manipulate this machinery in such a manner as to produce the best results. Right now the number of installations is still few compared with those that have been arranged for the very near future.

O ¶ *New Projectors*

OTHER problems have entered into the situation now. As reported elsewhere in this issue, it is rumored that RCA is planning to bring out a new projector to which its sound apparatus will be already attached. The Electrical Research Products Co. are also reported to be planning something similar. Why these moves should be necessary no one seems to know. The manufacturers now making projectors have already made changes and improvements in their machines to accommodate sound appliances. But in any case, it reveals that everybody concerned is working in deadly seriousness.

P ¶ *Many Problems*

PROGRESS in the number of installations would have been much more rapid but for several stumbling blocks in the way. First, the sponsors of sound picture apparatus realize that the equipment now in use and being marketed is crude in comparison with the same equipment that is to be issued three or six months from today. They are unwilling to sell large quantities of equipment that may be antiquated or imperfect so soon. These estimates are based on the work now being accomplished by engineers in the laboratories, who are the first to admit that they still have a long way to travel before they may cry "Finis." Another obstacle is the lack of some standardization of equipment now being put forward by the various companies. Exhibitors are in doubt as to which to buy, fearing that if they have one make installed in their theatres they will be unable to run the excellent feature pictures with sound that may be produced by one of the others. Exhibitors are marking time for a few months longer to see if this situation will be clarified. RCA and Western Electric realize this, and some sort of agreement between them must and most likely will be reached. But it's in the air. It's moving fast. The future for the craft, which means the future of the individual projectionist, is bright. . . . Well, it's time.

Boone Manneall

The New Model 1002 H Motiograph

By O. F. SPAHR

Enterprise Optical Manufacturing Company

THE new Model H Motiograph De-Luxe projector is radically different in principles involved and construction than the present types of projectors employing the outside rotating disc-type of shutter. It depends upon a new type of shutter of peculiar design for its important function of eliminating the heat from the film.

The new shutter is of a horizontal or cylindrical type. It is mounted on the film gate of the mechanism and operates between the film and the light source. It differs in construction from the rotating disc-type of shutter in that it has two circular vanes and is rotated on a horizontal axis. By these two vanes the light beam is cut off in a horizontal plane from top and bottom simultaneously. This being across the narrow dimension of the aperture, results in what may be termed a "quick cut-off." Thus, a gain in illumination over the old type front shutter is accomplished.

The action of the two vanes cutting the light beam simultaneously also is an advantage in that a cleaner cut-off is obtained, a more uniform distribution of the intervals of light and darkness, and a smoother shutter action with entire absence of back-lash travel ghost is the result.

Radical Heat Reduction

In the second purpose, the vanes of the shutter cutting off the light, and incidentally the heat, between the film and the light source, it is easy to reason that since the light is cut off during the whole interval of film motion before the aperture, there can be no heating, or rather pre-heating, of the film before it comes to a stop before the aperture, as is the case in the old type front shutter where the full action of the light beam is operating to heat the film both during the full film movement as well as during the whole time the film is at rest before the aperture.

A further cutting of the light beam during that portion of time when the film is stationary before the aperture is accomplished at that period known as the flicker interception. Thus, it will be seen with this new shutter that the entire action of the light beam and its incident heat is cut off from reaching the film while the film is in travel before the aperture, and once while it is stationary before the aperture. The heat of the light beam is only allowed to reach the film at two short intervals: once when the film comes to a stop before the aperture and again after the flicker



O. F. Spahr

interception has passed and until the film starts in motion again.

An idea of the construction of the new type shutter may be gained from the close-

up view in Fig. 1, in which the shutter vanes and construction is clearly indicated.

Comparative Tests

So efficiently has this worked out to reduce the heat at the film that actual tests conducted in the Motiograph laboratory show a reduction in temperature of the film heat at the aperture. (See table).

Thus, in the Model H the temperature at the aperture is 922° less than the old type projector, or 62½%. Tests were taken in each case over a period of 30 minutes or more of operation of each projector with a reflecting arc type of lamp as illuminant operated at 25 amperes.

The heat at the point just between the cooling plate and gate door taken after 30 minutes operation to determine the comparative heating of the metal surroundings the aperture opening in gate door showed that with the Model H the temperature at this point remained constant at 100° as against a temperature of 270° on the old type projector—all temperature readings in degrees Fahrenheit.

This actual comparison of heat of film temperatures at the aperture is really astonishing, and film runs cooler in the Model H even when the new high-powered

Comparative Temperature Tests on Model H Motiograph De Luxe Projector—in Comparison with Regular Projector with Old Type Outside Revolving Disc Shutter:

| | Model H | Old Type |
|---------------------------------|---------|-------------|
| | | 1486° |
| Film Speed—80 ft. per min..... | 565° | Temperature |
| Film Speed—90 ft. per min..... | 570° | the same at |
| Film Speed—100 ft. per min..... | 564° | all speeds. |
| Film Speed—110 ft. per min..... | 555° | |
| Average Temperature | 564° | |

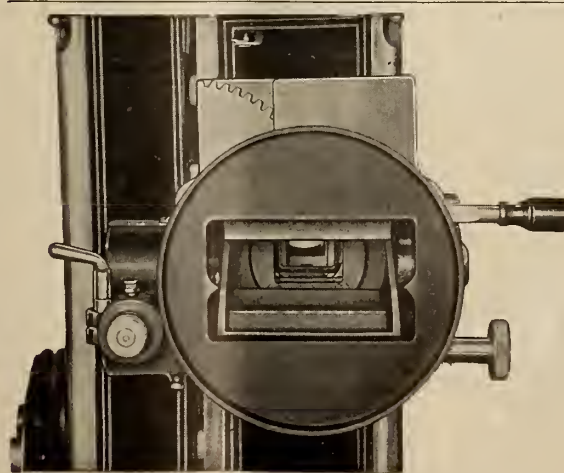


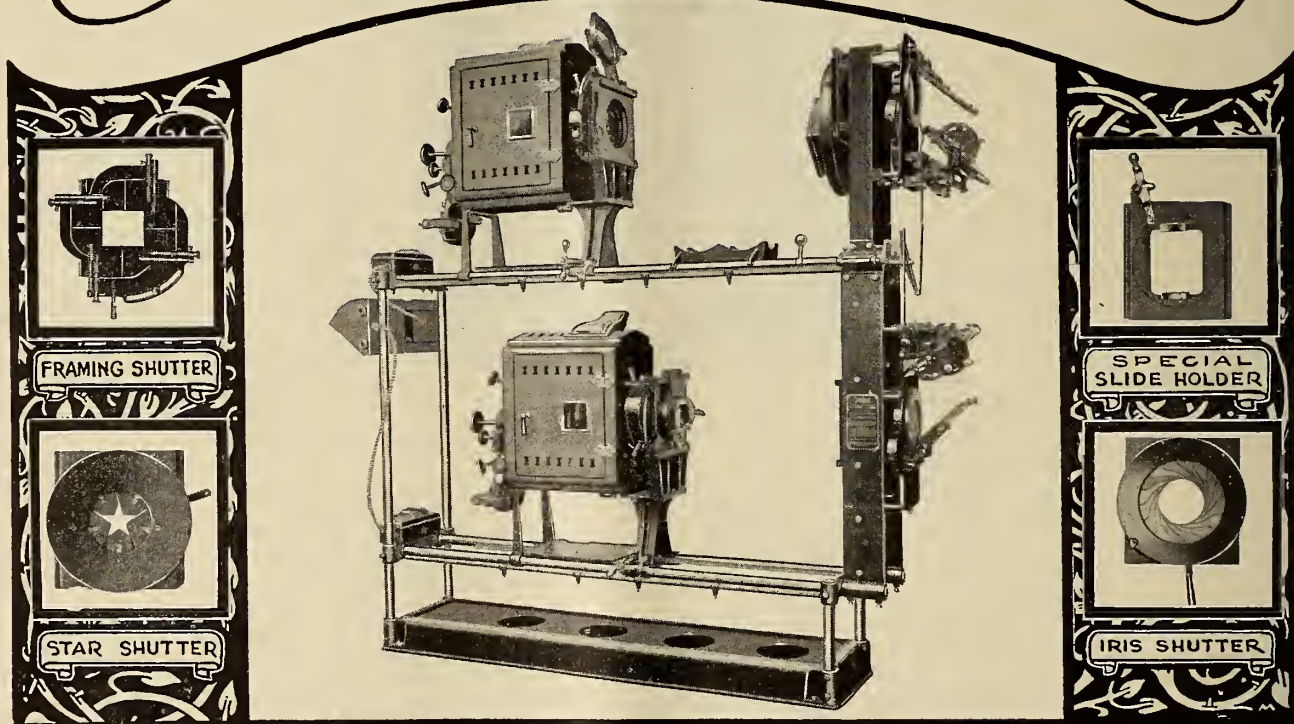
Fig. 1—A close-up rear view of the new shutter

illuminants are used than it did in the old projectors when the regular arc lamp and only 35-40 amperes at the arc was employed.

Raises Projection Standards

So evident is the result that it is not necessary to have the testing engineer's report of aperture temperatures to prove it. In the old type front shutter projector the film will feel decidedly hot and it will be extremely uncomfortable to leave the fingers on the film for any length of time. In the Model H the film will leave the lower feed sprocket practically as cool as when it

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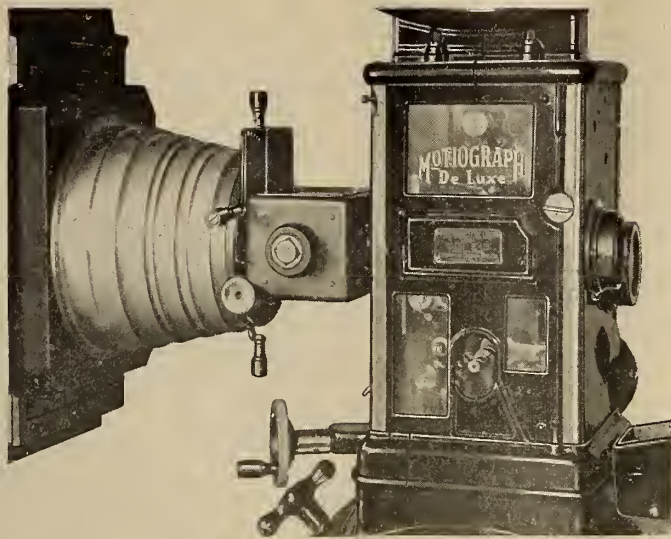


Fig. 2—Close-up of cone, shutter and mechanism

was taken from the film can. Moreover, the film will be absolutely flat, unwarped, buckled or embossed.

Its third purpose bears directly on the foregoing and benefits the entire industry in that because of eliminating the heat the film has longer life, it reaches the theatre in better condition, it eliminates dried out patches which result in stops, create fire hazards and annoy theatre patrons. Aside from abolishing these annoyances, however, it directly improves projection and enhances the definition of the picture.

The film being flat and unwarped and relieved of the intense heat at the aperture, there is no tendency for the film to buckle. As a consequence, the projection lens is able to function to deliver to the screen a true projected image from a flat focal plane. So important is this point that all the advantages of the high corrections of the really excellent modern lenses are fully realized. All of the fine detail and gradations of the present excellent examples of photography are transmitted to the screen in a beautifully defined and sharply focused image. This cannot be accomplished where the intense heat of the light beam is allowed to reach the film since under that condition the film buckles and absolutely true focus is impossible.

Many Hazards Eliminated

In the fourth purpose, we find that the new type shutter serves to reduce the fire hazard at least 60%. First, because of the fact that the heat being removed from the film almost entirely, combustion would be retarded. Second, being positioned between the film and light source and having two vanes or blades, there is a fifty-fifty chance that the vanes of the shutter would act as a fire shutter in the event that the mechanism or film should stop motion. Then there is the entire elimination of fire hazard due to the drying out of patches and the dried condition of the film itself.

The fifth purpose is also distinctly worthy and important. By a peculiar and carefully worked out design of the shutter construction wherein its ends are angled similar to the blades of a fan, but each end

of different pitch, and by the addition of air disassembling vanes there is produced a circulation of air which draws the radiated

heat away from the film tracks, tension shoes and springs, gate slide and cooling plates so effectively that these important parts are always cool and in a condition to function perfectly at all times.

The shutter and its housing are constructed of cast aluminum. Its bearings are of the ball bearing type, and due to the absence of friction, the entire mechanism operates more freely. There is an estimated 25% less pull on the motor.

Advantages for Projectionist

A novel method of manually setting the shutter in time has been worked out so that this operation when necessary may be speedily and simply accomplished and in a way that does not in the least affect the ready removal of the intermittent movement. A locking device and a shutter setting knob conveniently located on the operating side of the projector is provided for securing fine limit timing of the shutter while the mechanism is operating. In fact, all the advantages of the old outside front rotating shutter have been retained with none of its disadvantages. The complete enclosure of the new shutter and its

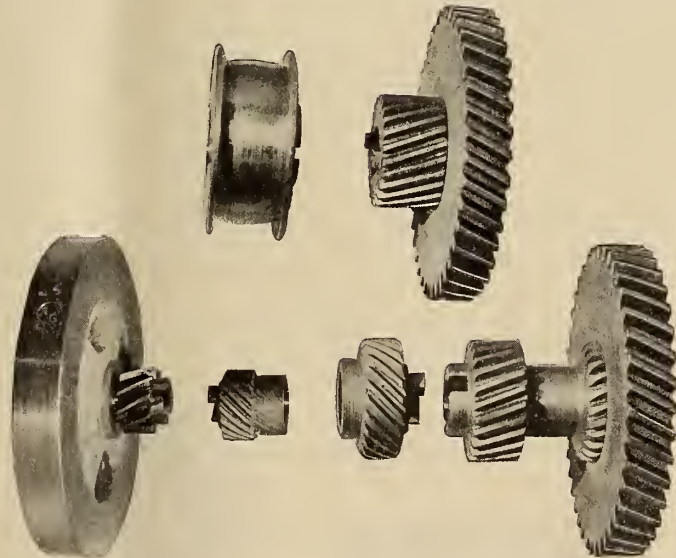


Fig. 3—Gears of old type construction

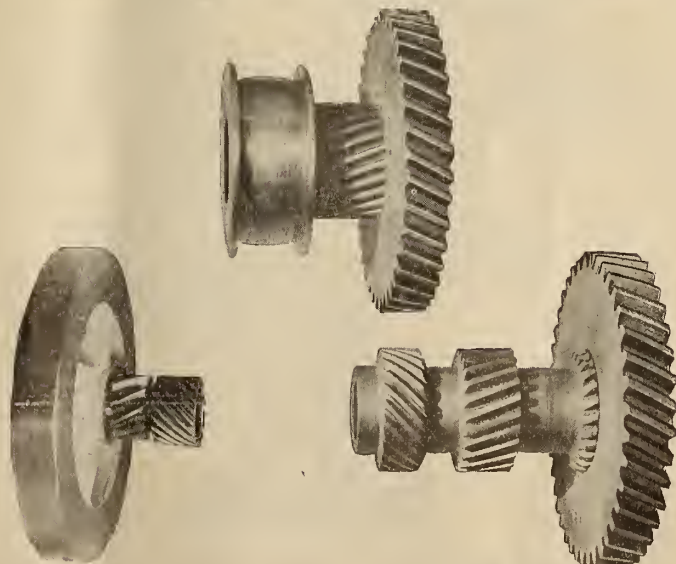


Fig. 4—Gears of new type construction

operating parts as well, lessens the danger of injury to the projectionists.

Of particular appeal to the projectionist is the fact that the new type shutter also eliminates the heating of the projection lens, and in these days when it is customary to purchase high grade and expensive lenses, this point merits consideration. The construction of the new dowser is clearly shown in Figure 1.

A long sought improvement of convenience for the projectionist is the new design of lamphouse cone which completely encloses the light beam from the lamphouse to the new shutter assembly, allowing no stray rays of light to seep out into the projection room to cause eyestrain or annoyance to the projectionist. A built-in observation glass in the top of the new type shutter housing allows full observation of the light spot at the cooling plate as well as affording opportunity to observe the operation of the shutter itself. In Fig. 2 is a close-up view of the new cone, shutter and mechanism.

New Cone Construction

The light cone is of cast aluminum construction and so designed of a number of concentric rings telescoping one within another that the cone may be collapsed for opening the film gate or adjusted for different positions of the lamphouse. Because of its special design for cool operation, the cone does not become heated and remains cool even after 15 to 20 minutes of projector operation.

An innovation in the dowser construction is that this is no longer assembled on the lamphouse or cone but is built in as a part of the new shutter housing. It operates on a new principle and is more accessible than the old type dowser assembled on the lamphouse cone. Two

operating handles are provided so that the dowser may be conveniently operated from either side of the projector.

In the mechanism itself many improvements have been made. By a new method of manufacture a number of the gears which were formerly made of two-piece construction are now made in single, or unit, construction. This type construction adds greater strength to the gear and affords more free-running mechanisms. An example of this will be seen in Fig. 3, in which is pictured the old type, and in Fig. 4, in which is seen the new unit type.

Many Minor Improvements

An improvement consisting of ling bracing of the topple gear shaft and casting renders this important part extremely rigid and promotes longer wear of the gearing by holding it in absolute alignment at all times.

Improvements have also been made in the idler and film guide rollers, tension springs and film tracks. A new type one-piece intermittent sprocket shoe is used which not only provides longer wear for this part but as well eliminates all danger of damaging the film when not carefully watched or renewed when necessary.

All silk-covered wire for the mechanism pilot lamp assembly has been replaced with metal-covered flexible wire and a new connection position for the service line provided.

The familiar base, lower magazine and lamphouse support rods of the previous Model F Motiograph, previously described in these columns, have not been changed since they were originally designed to secure a sturdy foundation, and no improvement has been necessary since. The Motiograph has always enjoyed the reputation for rock-steady projection and much

of its success in this direction has been due to the careful design of its floor base and lower magazine assembly in which proper distribution of weight and correct balance has adequately supplied strength and rigidity sufficient for the projector itself and the heaviest types of lamphouses.

The new type rapid tilting device which is a recent development to permit rapid tilting of the projector and which is provided with limit stops for predetermining the angle at either the up or down position

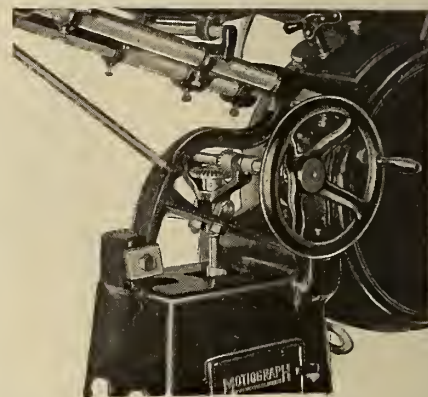


Fig. 5.—Rapid Tilting Device

is included in the New Model H as regular equipment. This is pictured as Fig. 5.

This device operates through gearing and ball bearings so easily that the hand wheel may be spun freely with one hand and the entire projector easily tilted without effort.

Operating Features

A new type motor control switch is provided, operated by convenient foot pedals, one on either side of the base so that the projector may be stopped or started from either side.

The speed control has been equipped with a graduated dial plate and adjustable pointer to enable setting the speed control to predetermined speeds. The projectionist once having determined that a certain point on the dial corresponds to a certain film speed per minute, may always set the speed control adjustment to that definite point.

For those theatres using the electric type of speed indicator, a new type speed indicator generator bracket has been developed and a driving pulley. This bracket attaches to the side of the mechanism near the base in such a manner that the generator is driven from the pulley on the gripping disc unit of the mechanism.

A new type of lower magazine door handle of convenient shape and self-locking design has been developed, and there are many other minor improvements included as regular equipment on the Model H.

In Fig. 6 is a view of the new projector with cone collapsed, lamp open and mechanism doors open.

The regular high-grade, baked-on enamel finish with gold striping will be retained but will be enhanced by the full bright nickel finish of all steel parts including lamphouse support rods and all trimmings.

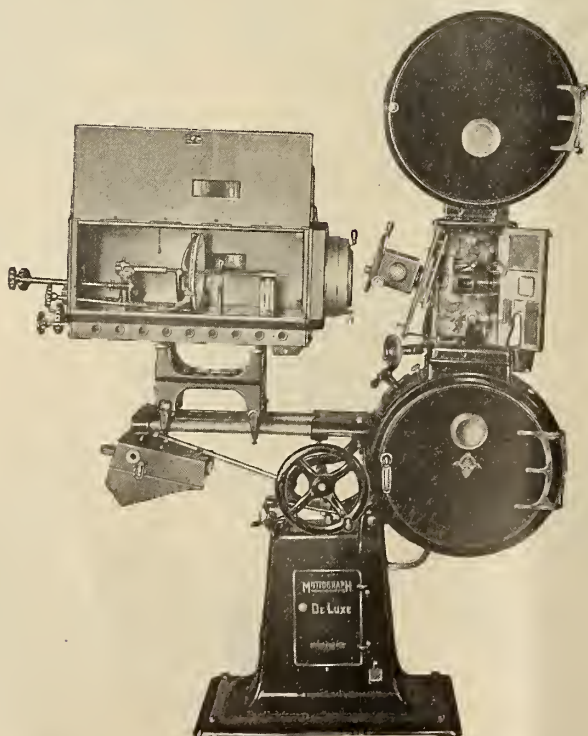
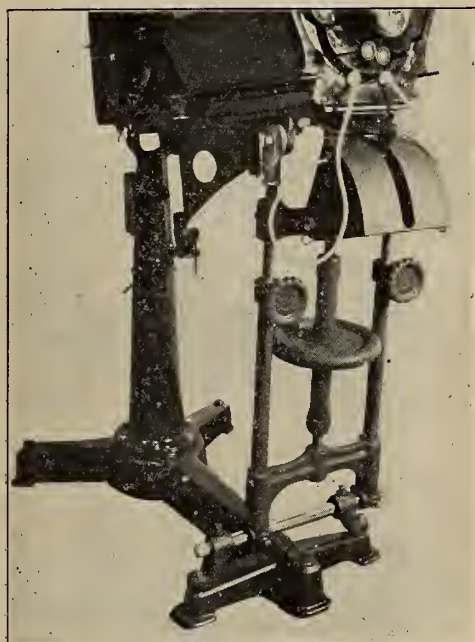


Fig. 6—The new projector with cone collapsed, mechanism open

The OLD Yields to the NEW



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817 Sixth Avenue New York City

Remote Control Kliegl

By ANDREW J. MCGREGOR

COMplete and entire operation of Mazda-type Kliegl spotlights—including the control of four or more color frames—can now be accomplished from any desired point. The spotlight itself may be located wherever requirements dictate—frequently in concealed and inaccessible places—and the electric control may be positioned wherever it is most convenient for the projectionist. And a group of spotlights can be simultaneously operated just as easily as one.

Well-known advantages of Mazda-type spotlights are (1) they do not require an attendant as is the case with arc-type spotlights; (2) they can be operated by a distant switch; and (3) they can be used with dimmers. But heretofore there has been no way of changing at will the color of the light beam, except by the manual removal and insertion of different color frames.

Now—with the perfection of this new device wherein the operation of the color frames is controlled electro-magnetically—the entire service of the spotlight in respect to white lighting, color lighting and dimming can all be controlled from a distant point.

Fewer Spots Needed

In many instances where color lighting was desired it has been the practice to install several groups of spotlights—one group for each of the colors desired. For example, a group of spotlights fitted with red filter colors, another with blue, another with amber or with green, and still another group for clear white or unmodified lighting—usually operating one group at a time. It is now possible to install a single

group of spotlights that will give all the color variations obtained with the several groups aforementioned—or to install the same number of spotlights, obtaining four or five times as much light for each color.

Also, since each color frame is independently operated, two or more color frames may be used at one time, obtaining a blending of colors—as, amber and red for producing orange—thus further extending the wide range of colors available.

Although each spotlight and color frame may be individually controlled, they also may be, and usually are, so wired that all the spotlights installed, or any selected group, may be changed instantly from one color to another, or all color frames removed giving the maximum intensity of white lighting—the operation being performed through the medium of a selective control board with master switches. In fact, the possibilities of arrangements in controls, for obtaining color effects, are practically unlimited.

Many Applications

In theatres where the direction of illumination is fixed, these new Kliegl spotlights are splendid units for spotlighting or floodlighting the stage—from the balcony rail, from a recess in the ceiling, or from concealed locations in other parts of the house. The bright beams are thrown directly upon the performers, thus eliminating all facial shadows and distortions caused by floodlights and overhead lighting. They also provide excellent facilities for lighting front drops with varied color schemes during overtures, and for floodlighting the orchestra.

This new Kliegl spotlight is designed for

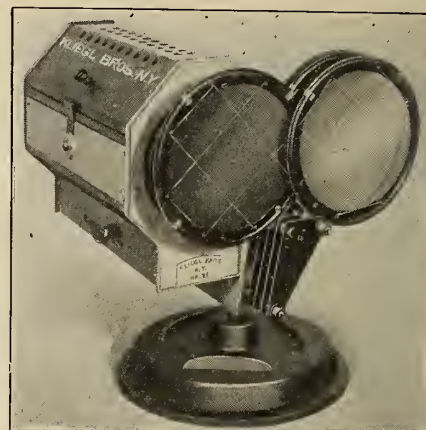


Fig. 2—Color frames in position in front of lens as when used for color lighting.

use with a 1,000-watt G40 or a 2,000-watt G48 concentrated filament lamp. It projects a brilliant spot of light any distance up to 100 feet, and when used for floodlighting gives a wide spread of evenly-diffused light. The mogul screwbase receptacle is mounted on a sliding base with an extension wing nut for focusing.

A concave mirrored-glass reflector is mounted back of the lamp utilizing all the available candlepower of the lamp and giving the greatest possible illumination at the maximum efficiency. The housing, of aluminum and rustless iron, is substantially constructed, light in weight, well ventilated, and light-tight. The top of the housing is hinged and permits access to the interior for changing lamps. The front is fitted with a 6-inch condensing lens mounted in an aluminum frame and held in place with a split ring, allowing unrestricted expansion.

Control Magnets

The color-frame control magnets are mounted in a casing on the side of the spotlight. They are of the plunger type, and actuate concentric shafts which extend along the side of the spotlight. At the extreme end of each shaft a color frame is attached. A separate magnet controls each color frame. Springs hold the color-frames back out of position in front of the lens; but when current flows in one of the magnets, the plunger is drawn down and the color-frame is thrown into position in front of the lens, where it remains as long as current flows in the magnet. Upon opening the circuit the retrieve spring throws the color-frame out of position. Special shock absorbers take up the rebound; the operation is noiseless.

The magnets, which are wound for 115 volts and consume but 44 watts, are liberally designed, are not affected by normal variations in voltage, do not overheat, and last indefinitely. The cover of the magnet-control casing can readily be removed for

(Continued on page 21)

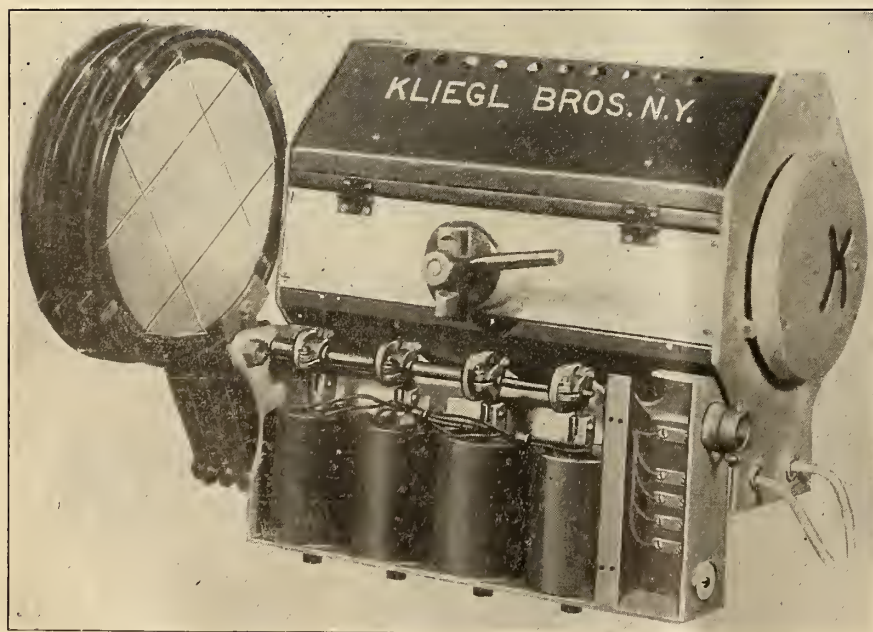


Fig. 1.—Kliegl Spotlight No. 72 with cover of magnet-casing removed showing electro-magnets and control mechanism

| Part No. | Description | C-100-A | Cam: | Framing Cam. |
|----------|--|---------|----------|---|
| | "A" CENTRE FRAME ASSEMBLY. | P-125-A | Pin: | Framing Cam Locating Pin. |
| | Complete "A" Sub-Assemblies. | | A-8 | Focusing Pinion Knob. |
| C-126-A | A-1 Handle Shaft and Collar. | K-131-A | Knob: | Focusing Pinion Knob. |
| C-189-A | Clutch: Main Driving Gear Clutch. | R-178-A | Rod: | Focusing Pinion Rod. |
| P-115-A | Collar: Handle Shaft Driving Collar. | S-141-A | Screw: | Focusing Pinion Set Screw (3). |
| S-287-A | Pin: Handle Shaft Driving Collar Pin (2). | S-756-A | Screw: | Focusing Pinion Screw. |
| | Shaft: Handle Shaft. | | A-9 | Projecting Lens Holder and Slide (Mass. Req.) |
| | A-2 Shutter Adjusting Screw Assembly. | H-149-A | Holder: | Projecting Lens Holder (includes P-124-A) |
| K-120-A | Knob: Shutter Adjusting Screw Knob. | P-124-A | Pin: | Focusing Gih Pin |
| S-125-B | Screw: Shutter Adjusting Set Screw. | R-150-A | Rod: | Projecting Lens Holder Slide Rod (2). |
| S-252-A | Screw: Shutter Adjusting Screw. | S-145-G | Screw: | Projecting Lens Holder Jacket Screw. |
| | A-4 Projecting Lens Holder and slide. | S-342-A | Spring: | Projecting Lens Holder Slide Rod Spring (2). |
| H-149-A | Holder: Projecting Lens Holder (includes P-124-A) | S-494-A | Screw: | Focusing Rack Retaining Screw. |
| P-124-A | Pin: Focusing Gih Pin. | S-772-A | Slide: | Projecting Lens Holder Slide. |
| R-150-A | Rod: Projecting Lens Holder Slide Guide Rod (2). | S-783-A | Screw: | Projecting Lens Holder Slide Stop Screw (4). |
| S-145-G | Screw: Projecting Lens Holder Jacket Screw. | W-118-A | Washer: | Projecting Lens Holder Slide Washer (2). |
| S-161-E | Screw: Projecting Lens Holder Slide Stop Screw (2). | | | |
| S-322-A | Slide: Projecting Lens Holder Slide. | | | |
| S-342-A | Spring: Projecting Lens Holder Slide Guide Rod Spring (2). | | | |
| S-494-A | Screw: Focusing Rack Retaining Screw. | | | |
| W-118-A | Washer: Projecting Lens Holder Slide Washer (2). | | | |
| | A-5 Handle Shaft Oil Tube and Wire Assembly.— | | | |
| T-108-A | Tube: Handle Shaft Oil Tube. | A-131-A | Arm: | Focusing Rack Arm. |
| W-134-A | Wire: Handle Shaft Oil Tube Wire. | B-127-A | Bracket: | Vertical Shaft Bracket. |
| | A-6 Lower Sprocket Shaft Oil Tube and Wire Assembly. | B-198-A | Base: | Centre Frame Base. |
| T-113-A | Tube: Lower Sprocket Shaft Oil Tube. | F-100-A | Frame: | Centre Frame. |
| W-134-A | Wire: Lower Sprocket Shaft Oil Tube Wire. | G-121-A | Gib: | Focusing Slide Gih. |
| | A-7 Framing Cam, Arm and Pin Assembly. | L-130-A | Lock: | Slide Stop Screw Lock. |
| A-117-A | Arm: Picture Framing Cam Arm. | N-118-A | Nut: | Picture Framing Handle Pivot Nut. |
| | | N-123-A | Nut: | Adjusting Screw Lock Nut. |

| Part No. | Description | | |
|----------|---|---------|---|
| P-106-A | Pin: Base Dowel Pin. | S-253-A | Screw: Shutter Adjusting Slide Lock Screw. |
| P-167-A | Pin: Shutter Adjusting Slide Stop Pin. | S-278-A | Screw: Pad Roller Arm Tension Spring Fastening Screw. |
| P-188-A | Pin: Vertical Shaft Bracket Pin. | S-283-A | Screw: Vertical Shaft Bracket Screw. |
| P-189-A | Pinion: Focusing Pinion. | S-323-A | Slide: Shutter Adjusting Slide. |
| P-196-A | Pivot: Picture Framing Handle Pivot. | S-340-A | Spring: Lower Sprocket Roller Arm Spring, Old Style. |
| R-133-A | Ring: Framing Cam Adjusting Ring. | S-343-A | Spring: Rack Arm Friction Spring. |
| S-115-A | Screw: Centre Frame Screw. | S-353-A | Spring: Upper Sprocket Roller Arm Spring, Old Style. |
| S-118-L | Screw: Motor Drive Pinion Set Screw. | S-356-A | Support: Oil Tube Support. |
| S-143-A | Screw: Framing Cam Adjusting Ring Screw. | S-445-G | Shaft: Top Sprocket Shaft. |
| S-231-A | Screw: Centre Frame Base Oil Retaining Screw. | S-569-A | Spring: Lower Sprocket Roller Arm Spring. |
| S-248-A | Screw: Roller Holder Screw. | S-570-A | Spring: Upper Sprocket Roller Arm Spring. |

"B" Single-Bearing Movement

| "B" SINGLE BEARING INT. MOVEMENT, COMPLETE. | | | |
|---|--|---------|--|
| Part No. | Description | | |
| | Complete "B" Sub-Assemblies. | | |
| | B-1 Intermittent Case. | W-131-B | Wheel: Intermittent Sprocket Wheel. |
| C-120-B | Clamp: Oil Tube Clamp. | B-1 | B-12 Intermittent Case and Cover. |
| C-230-B | Case: Intermittent Case. | B-8 | Case: Intermittent Case. |
| S-106-D | Screw: Oil Tube Clamp Screw. | | Intermittent Case Cover. |
| T-103-D | Tube: Bushing Oil Tube. | G-148-B | B-14 Fly Wheel and Gear Assembly. |
| T-107-B | Tube: Shaft Oil Tube. | S-692-B | Gear: Fly Wheel Gear (includes S-692-B and S-693-B). |
| | B-4 Eccentric Bushing and Sleeve Assembly. | S-693-B | Screw: Fly Wheel Set Screw, New Style. |
| B-132-B | Bushing: Eccentric Bushing. | W-152-B | Shoe: Fly Wheel Set Screw Shoe. |
| S-319-B | Sleeve: Eccentric Bushing Sleeve. | | Fly Wheel. |
| | B-8 Intermittent Case Cover and Locks. | | B-15 Fly Wheel Shaft and Gear Assembly. |
| C-148-B | Cover: Intermittent Case Cover. | G-105-B | Gear: Fly Wheel Shaft Gear. |
| C-294-BB | Clamp: Intermittent Case Cover Clamp (2). | S-454-B | Shaft: Fly Wheel Shaft. |
| S-125-B | Screw: Eccentric Bushing Screw (2). | | B-16 Star Wheel Cam Assembly Complete (includes B-19). |
| S-157-B | Screw: Intermittent Case Cover Lock Screw (2). | G-118-B | Gear: Star Wheel Cam Gear. |
| P-347-B | Pin: Intermittent Case Cover Pin (2). | P-279-B | Pin: Star Wheel Cam Pin. |
| | B-9 Star Wheel, Sprocket and Bushing (includes B-4). | W-122-B | Washer: Star Wheel Cam Washer. |
| P-153-B | Pin: Intermittent Sprocket Wheel Taper Pin (2). | | B-10 Star Wheel Cam and Gear. |
| S-551-B | Shaft: Star Wheel and Shaft. | C-274-B | B-19 Cam Shaft Collar and Screw. |
| W-131-B | Wheel: Intermittent Sprocket Wheel. | S-648-B | Collar: Cam Collar. |
| | B-11 Star Wheel and Intermittent Sprocket. | | Screw: Cam Collar Shaft Screw. |
| P-153-B | Pin: Intermittent Sprocket Taper Pin (2). | | |
| S-551-B | Shaft: Star Wheel and Shaft. | | |

"B" PARTS

| | |
|---------|---------------------------|
| W-105-B | Washer: Fly Wheel Washer. |
| S-286-B | Shaft: Fly Wheel Shaft. |
| P-123-B | Pin: Fly Wheel Taper Pin. |

"BB" Double-Bearing Movement

| "BB" DOUBLE BEARING INTERMITTENT MOVEMENT COMPLETE. | | | |
|---|---|----------|--|
| Part No. | Description | | |
| | Complete "BB" Sub-Assemblies. | | |
| | BB-21 Intermittent Case Assembly. | BB-24 | Cam: Intermittent Cam. |
| C-292-BB | Case: Intermittent Case. | G-186-BB | Gear: Cam Gear. |
| C-293-BB | Cup: Intermittent Oil Cup. | P-360-BB | Pin: Cam Pin. |
| P-121-C | Pivot: Intermittent Adjusting Pivot. | | BB-26 Star Wheel Shaft and Sprocket Assembly. |
| | BB-22 Intermittent Case Cover with Arm Complete (Includes BB-23). | P-350-BB | Pin: Intermittent Sprocket Pin (2). |
| B-248-BB | Bearing: Star Wheel Shaft Inner Bearing. | S-730-BB | Shaft: Star Wheel and Shaft. |
| B-249-BB | Bearing: Star Wheel Shaft Outer Bearing. | S-750-BB | Sprocket: Intermittent Sprocket. |
| C-265-BB | Collar: Star Wheel Shaft Collar. | | BB-27 Fly Wheel Shaft and Gear Complete. |
| S-177-E | Screw: Collar Set Screw (2). | G-187-BB | Gear: Fly Wheel Shaft Gear. |
| S-432-E | Screw: Film Trap Shoe Screw (2). | S-726-BB | Shaft: Fly Wheel Shaft. |
| S-724-BB | Screw: Bearing Screw (6). | | BB-28 Fly Wheel and Gear Complete. |
| S-731-BB | Stripper: Intermittent Film Stripper. | G-185-BB | Gear: Fly Wheel Gear. |
| | BB-23 Intermittent Case Cover Assembly. | W-191-BB | Wheel: Fly Wheel. |
| A-154-BB | Arm: Case Cover and Bearing Arm. | | BB-29 Fly Wheel Lock Nut and Screw. |
| G-189-BB | Glass: Case over Glass, Left. | N-171-BB | Nut: Fly Wheel Lock Nut. |
| G-195-BB | Glass: Case Cover Glass, Right. | S-725-BB | Screw: Fly Wheel Lock Nut Screw. |
| P-353-BB | Pivot: Case Retaining Clamp Pivot (2). | BB-30 | Fly Wheel Lock Nut Complete (Includes BB-29). |
| | BB-25 Intermittent Cam Assembly Complete (Includes BB-24 and B-19). | K-130-BB | Key: Fly Wheel Lock Key. |
| | | BB-31 | Outer Bearing Oil Cup Complete. |
| | | B-250-BB | Ball: Outer Bearing Oil Cup Ball. |
| | | C-296-BB | Cup: Outer Bearing Oil Cup. |
| | | S-734-BB | Spring: Outer Bearing Oil Cup Spring. |
| | | BB-32 | Taper Pin Ejector. |
| | | B-254-BB | Block: Intermittent Sprocket Taper Pin Stripper Block. |
| | | S-757-BB | Screw: Intermittent Sprocket Taper Pin Stripper Screw. |

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| A | Centre Frame Assembly | N | Type "B" Arc Lamp and Lamphouse Assembly (See Form 553) |
| B | Intermittent Case Assembly—Eccentric | O | Type "B" Lamphouse Less Arc Lamp Assembly (See Form 553) |
| BB | Intermittent Case Assembly—Double Bearing | Q | Type "S" Arc Lamp and Lamphouse Assembly (See Form 553) |
| C | Mechanism Assembly | R | Simplex Accessories |
| D | Outside Mechanism Assembly | S | Motor Equipment |
| E | Film Trap Assembly | T | Curtain Dissolver Assembly |
| F | Type "B" Arc Lamp Assembly (See Form 553) | U | Upper Magazine Assembly |
| G | Inside Mechanism Assembly | V | Film Footage Register Assembly |
| I | Incandescent Lamphouse Assembly | W | Lower Magazine Assembly |
| J | Arc Control Assembly | X | Variable Speed Control Assembly |
| L | Pedestal Assembly | | |
| M & P | Rewind Assembly | | |

New Kliegl

(Continued from page 18)

making electrical connections or for purposes of inspection.

Color Frames

The color frames are light, circular, metal frames made in two sections and provided with spring clasps. To insert or replace gelatin color filters is simply a matter of removing the clips and inserting the gelatin between the two sections, trimming to size and replacing the clips. Guard wires protect the gelatin.

The spotlight is perfectly balanced and mounted on a substantial pivot bearing which permits it to be adjusted to any desired angle. It is set on a short stand with a heavy cast iron base which provides a firm foundation for the lamp, free of vibration and not easily upset. It can also be furnished mounted on a tall pedestal stand where a greater height is needed; on a horizontal iron pipe or any other type of mounting that may be desired.

Wiring

The terminals of electro-magnets are brought out to a small junction block at the end of the magnet casing, and cable outlets are provided. Where a number of spotlights are installed they may be wired so that each spotlight and each color frame is independently controlled; or wired in multiple so that a group of spotlights and color frames can be operated simultaneously. There are an unlimited number of combinations that can be devised to suit individual requirements.

Color Study

The color of any object is due to the color of the particular light rays that its surface will reflect. The rays of sunlight are not all the same: it is in reality a mixture of rays of different colors, and the rays of each color travel through the ether in waves of a particular length. Sunlight therefore is composed of light of all colors.

There are only three colors that are pure and unmixed; these primary colors, as they are called, are red, yellow and blue. All other colors are mixtures of these primary colors. For example, orange is a mixture of red and yellow; green a mixture of red and blue; black is not a color. Gray is a mixture of white and black. Light and dark shades of color are produced by mixing with pure color varying amounts of white and black.

Notice!

Projectionists who are approached by architects seeking information on sound picture requirements for projection rooms are urged to refer the inquiry to the Service Dept. of THE MOTION PICTURE PROJECTIONIST, which is prepared to give full information on the subject.



Cover removed, showing electro-magnets and mechanism that permits remote-control operation of the color frames.

GREAT IMPROVEMENT

A NEW SPOTLIGHT with electro-magnetic device for remote control of its color frames—permitting an endless variety of changing color effects—all controlled from a central point.

Never before has there been such a demand for color-lighting—and never before has there been available a spotlight as flexible in its control, as boundless in its range of colors, as satisfactory in operation, as this new Kliegl Spotlight—that allows its entire service, including white lighting, color-lighting, and dimming, all to be controlled from a distant point.



Kliegl Spotlight No. 72 with Electro-magnetic Color-frame Control; for 1000-watt G40 or 2000-watt G48 Mazda lamp; with 6-inch lens, automatic color-frame control, four color frames, mirrored-glass reflector, and short pedestal stand.

Already in successful operation in several prominent newly-erected theatres (names on request), it promises to revolutionize present-day practice of color-lighting. One spotlight or a group of spotlights can be controlled with the utmost ease. Colors can be blended to produce most unusual effects. Fewer spotlights are needed—one group doing the same work that required several groups heretofore. More light can be obtained from any given number of spotlights. The spotlights can be located in the most inaccessible places—and yet be operated without the least difficulty from the switchboard or some other convenient location. They save time, trouble, and expense, give a greater and better service.

Write for an interesting folder, Bulletin No. 3, which illustrates and describes the many advantages, uses, and special features of this new Kliegl Spotlight.

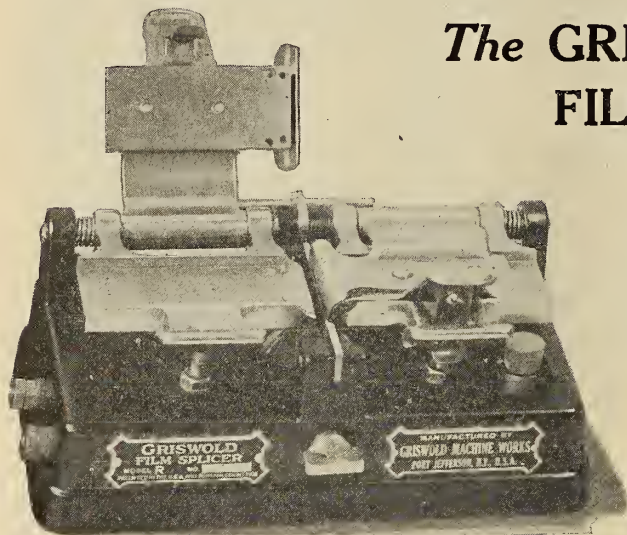
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Television Progress

TELEVISION has stepped out of the laboratory as far as transmission is concerned and is no longer limited to studio work, according to a Bell Laboratories engineer after conclusion of a test in New York recently in which the action of a tennis player atop a skyscraper roof was transmitted three floors below to a darkened room wherein was a group of men who witnessed the very same action executed on the roof.

And with this successful experiment television threw off the shackles of insufficient light which have hampered its progress for several years and, by admitting the sun to partnership with the radio, definitely dispensed with the need for glaring lights hitherto necessary for the transmission of only the head and shoulders of a single person.

Harness Sun's Rays

These tests were made possible by the perfection of a new photo-electric cell of extreme sensitivity and by the harnessing of the sun's rays to do the work formerly done by artificial light. In the future, through the medium of this new device, it will be possible to transmit telephoto pictures of unrestricted scope, such as football games, boxing bouts, panoramas and, in fact, any type of subject desired.

The television camera utilizes a cloth hood in much the same fashion as the old type of ordinary camera. A lens five inches in diameter projects from an opening in the black cloth. Behind the lens and hidden by the cloth is Nipkow's disk, measuring three feet in diameter. It has fifty tiny holes along its outer rim. They measure 1/16 inch in diameter and are so arranged that no line effect is noticed on the picture at the receiving end. The disk is of aluminum, painted black, and when in operation it revolves so that each of the little light openings passes a given point eighteen times in a second. This creates 900 lines to "paint" the image. The impulses are so rapid that the lines are blended and the picture looks like a half-tone.

The great sensitivity of the new photo-electric cell is the reason why less light is required on the image. The camera will even operate on a hazy day, but clouds that shut off the sun lower the efficiency of the machine, according to the engineers.

Lens Swung Back and Forth

The image is focussed by moving the lens back and forth. In fact, the principle is the same as that of a kodak. In the first form of equipment demonstrated in April last year the scene was illuminated by a rapidly oscillating beam from a powerful arc light. The scene to be broadcast was thus limited to a very small area. The new machine frees television from this serious limitation. The experiments yesterday showed that moving persons and objects a considerable distance away can be successfully scanned. Dr. Frank Gray was in charge of the television camera in the demonstration.

The televisior was not linked with a broadcasting station in the experiment, but

was connected with the receiving apparatus by wire. It was explained by the engineers that this was merely to facilitate the demonstration. They said attachment to a broadcast transmitter could be just as easily handled. The radio-camera can be used several miles from the broadcasting station and be connected to it by land lines as are microphones that pick up music from points outside the studio.

Novel Improvements

The receiver was shrouded in darkness. One merely saw a picture about two and a half inches square of the tennis player on the roof as he jumped about and swung his racket. The engineers, however, said there was nothing new in the receiver and that it was the same as demonstrated a year ago. They pointed out that the main new development was the elimination of the glaring "electrical eyes" and the substitution of sunlight at the transmitting end.

"It is merely a step forward," said an engineer. "It does not mean that television will be ready for use in every home equipped with radio tomorrow. The equipment is too elaborate for home use. It requires experts to operate the instruments, although part of the receiving station is an ordinary radio receiving set. We hope to make the pictures larger. We hope to have television so that it can be used in a living room without having it darkened. Perhaps some day we will flash the images on a screen like the movies, but when that will be we cannot say."

Is the Photo-electric Cell Securely in Place?

One thing that will certainly cause difficulties due to loss of volume and quality is incorrect position of the photo-electric cell. This may be correctly set in the first place, but due to vibration of the projector it may become rotated or it may slide lengthwise in the clamp that holds it. The cell can be clamped only so tight without danger of cracking the glass and the continued vibration may finally cause it to shift.

The window of the cell will not then be squarely in front of the light beam which is varied by the modulations in the film. If the cell is so placed that only a portion of the beam enters it, or if the light is cut off by dirt and oil covering the window, then the electrical responses to the light variations will not be what they should and would be under normal conditions. To get the proper volume the fader will have to be turned up high. The quality will also suffer.

In some instances, perhaps in most, it is much easier to prevent the occurrence of trouble by regular, careful attention than it is to track down the cause once the trouble is present. Movement of the photo-electric cell out of position is one of these instances. It is a simple thing, but it has a number of times been found at the root of trouble. It should be regularly checked-up.



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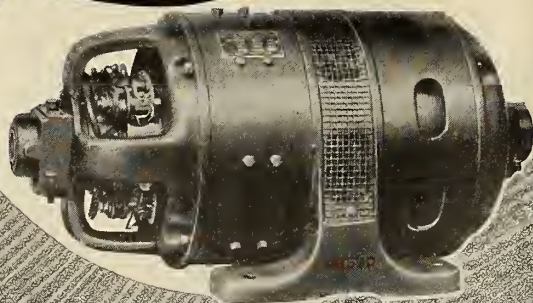
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'Talkie' Projection Room Requirements

PROJECTION room requirements to insure the best operating results for sound picture apparatus are contained in the following reply by engineers for Electrical Research Products Co., who handle Vitaphone and Movietone installation and maintenance, to an inquiry from an architect who is planning a new theatre:

In order that the projectionists may be able to follow the speech and music program and make their change-overs at the right moment, a horn for monitoring is located in the booth. This horn should not, of course, be heard by any of the audience and the projection room must therefore be reasonably soundproof. This condition will ordinarily be fulfilled if the ports and lookouts are glassed in. High-grade, clear optical glass should be used.

For the observation port the glass should be set at such an angle that reflections will not strike back into the projectionist's face.

Ample Clearance

The location of the equipment in the projection room is important. The two projectors to be equipped should be located on centers 5' apart with $3\frac{1}{2}'$ clearance to the left of the center line of the left projector and comfortable operating clearance to the right of the right projector.

An overall length of 15' will ordinarily be sufficient for a projection room having only two projectors and no spots or effect projectors. Any superfluous equipment in the room might well be removed to allow ample working space. A projection room about 10' deep is desirable in order to locate the equipment in the most advantageous position, and still leave ample clearance at the rear of the lamp housings. The height of the room should be 8' or more.

On the front wall between projectors there should be sufficient space for the location of the switching panel and the fader. These will occupy a wall area approximately $9\frac{1}{2}"$ wide by 17" high, and will ordinarily be mounted half way between the projectors at an approximate height of 5' from the floor. To the right of the right projector will be located an auxiliary fader, $9\frac{1}{2}"$ by $9\frac{1}{2}"$, positioned at the same height as the master fader.

Power Requirements

The installation requires that there be available a source of 110-volt power, either d.c., or alternating current of 60 cycles, which is capable of carrying an additional drain of 30 amperes. It is also advisable that the motor outlets for the projectors be separately fused. If they are, the same circuits can be used for the motor drives of Western Electric sound projection equipment.

Batteries are a part of the equipment and this necessitates a space convenient to the room for their accommodation. This space should be at least 6' x 8' partitioned off from other equipment. Good ventilation is essential because of the corrosive fumes given off during charging. There should be available in this space a source of 110-volt power, either d.c., or alternating current of 60, 50 or 25 cycles, which is capable of carrying an additional drain of 20 amperes.

An Answer to Gerald W. Link

THE article in your June issue by Gerald W. Link on *The Future of Projection* interested me greatly, but please allow me to say that it is far from an accurate picture of the real trouble with projection equipment—if indeed there is any trouble with it at all. We manufacturers have a complaint of our own to set forth, and if you will permit me the same courtesy extended to Mr. Link, I shall try to make my feelings clear. I should like it understood, however, that I do not wish to become embroiled in any controversy over this matter, and for that reason I shall ask you to refrain from using my name in connection with your use of this letter.

I should like to preface my main points with the observation that this question of whether manufacturing standards have kept pace with the projectionist craft, and vice versa, is bound to come up again and again in any discussion of projection and projectionists.

Issue Highly Debatable

In short, the matter is debatable, and quite as strong guns may be trained from one side as from another. While sympathizing with the projectionists' outlook, I cannot help but think that the manufacturer also has some very strong points in his favor; and I should know, for I have been on both sides of the fence.

I believe that, as a whole, the manufacturers do try to make improvements on their equipment as they go along. They may not have elaborate laboratories, as Mr. Link states they should have, but they are either themselves engineers of no mean ability or else they employ engineering brains periodically to make improvements. I know several manufacturers who have a sales force to direct their offices the while they spend all their time in the shop, always trying out new ideas which may be used to improve their product.

Present Equipment Adequate

As a matter of fact, inventions of new machinery are always called out by the existent necessity for them. For years now we have had the straight, flat, black and white pictures, and for the proper projection of these the equipment now available is capable and adequate. It may be that equipment can be devised which will perform on altogether different principles than those now employed. But just what would be the advantage of that, unless, in the change of principle, there is also an improvement in the quality of projection?

Several such pieces of equipment, built on new principles, actually did come out; but despite the fact that marvelous qualities were claimed for them they worked no better than existing equipment. These new pieces simply were more involved in both construction and operation. They were neither economical in price nor in operation, hence they dropped out of sight rapidly.

Yet I do not wish to give the impression that projection manufacturers have

IN deference to the request of the writer of the letter which we print here, we have not given his name, but he is a leading manufacturer of projection equipment.

Mr. Link's letter in the last issue was so full of provocation that we felt sure it would draw fire. It did—from quite a number of sources. We received many letters from Projectionists commending his views and we heard from half a dozen manufacturers.

There is no doubt that there is more interest in projection today than there ever was before. It may be due to a number of causes—but the fact is that this new interest is rife and there seems to be a re-birth of ideas, suggestions and constructive thought which will do projection and projection equipment a lot of good. It is not the aim of the editors of *THE MOTION PICTURE PROJECTIONIST* to enter into controversy or to permit controversies to rage within its pages. But we will publish whatever will stimulate further thinking on the subject of better projection, whatever will keep the pot boiling.

We are in a new era. Let us make progress. Let us exchange constructive views, either through the medium of this publication or with the manufacturer direct. There is much to be done. Now is the time to start.—THE EDITOR.

already attained a Paradise of Perfection and that now they can sit back and be content to count the dollars as they flow in. On the contrary, a great deal remains to be done. And a great deal is being done. Lack of competition is not retarding the progress made by projection equipment, as Mr. Link suggests. Actually, competition is very keen in the very limited market, which is what the motion picture industry affords at its best.

Projectionist Aid

Nor are we unmindful of the fact that projectionists have been responsible for many of the improvements that have been made on projection equipment. Let me say that we manufacturers seek these suggestions and we use them gladly—when they are available, which surely is not too often. That is as it should be.

No one can be more familiar with the limitations and the possibilities of projection instruments than the man who uses them day in and day out over a long period of years. On this point I am in thorough accord with Mr. Link. But I make a reservation: that this condition is not true of all projectionists—and there is where the rub comes in.

Interest Long Dormant

But before you started to publish your paper interest in the craft was dormant—projectionists were more or less dormant toward their work, and the industry as a whole was dormant toward the craft. While there were a few enterprising men at work here and there trying to help the manufacturer, writing suggestions to him from time to time, pointing out trouble that they encountered with this or that bit of equipment—which information the manufacturer could use as a basis for improvement—most of the craft took no interest at all.

I know a group of manufacturers in my city—I was one of them—who decided to write to a given number of projectionists in and outside our city to ask for suggestions on certain pieces of equipment. Here are the figures: Out of some hundred letters mailed out, only seven projectionists

took the trouble to reply at all, and only one of them offered any suggestions. The others said honestly that they hadn't made a study of the situation and couldn't be of any help.

Changed Conditions

What does this mean? It means to us, at least, that projectionists weren't taking the proper interest in their work. Now, I don't want to be misunderstood. They all without doubt gave their audiences perfect shows, and most likely the managers or owners of the theatres were well pleased with their work. What I mean is that they didn't look upon their work as a fertile field for investigation, research, improvement; they didn't seem to want to make any attempt to discover hidden possibilities which the manufacturer could develop.

That seems to me to be the trouble with the craft today. Most of the boys are too content to know just what switch to pull or what button to press, as you yourself said in one of your interesting editorials.

Cooperation Necessary

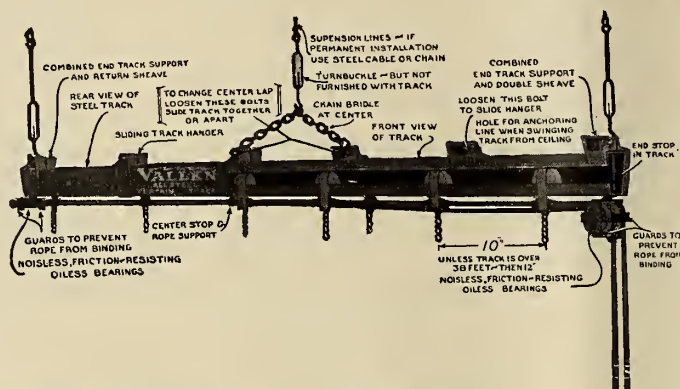
I suggest that projectionists tackle their work more seriously than ever before. I suggest that they make an earnest study of the equipment in their projection rooms, how and of what it is built, how and why it functions, how to take it apart and put it together again.

I suggest that they make a study of other types of equipment used in theatres other than their own. The aim should be to have a close familiarity with everything that applies to projection.

I suggest that projectionists look upon their work as a profession and begin to study the possibilities of making improvements in existing machinery or to bring out better pieces of equipment. It isn't always a question of financing. A good blueprint will interest any manufacturer and he will be willing to pay well for ideas alone.

Having done all this, I am willing to wager that projectionists will not find the manufacturers lagging far behind them—if at all. We manufacturers will do our share; but just how far will projectionists go in cooperating with us?

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RCA Wire Hook-Up Blankets Country

The Radio Corporation of America, sponsors of the Photophone, because of its affiliations with the American Tel. & Tel. and with General Electric, would seem to be more advantageously set with regard to newsreel production than are their competitors.

For any particular news event RCA could employ the A. T. & T. hook-up to bring the sound recording direct by wire to the laboratories of the General Electric at Schenectady, N. Y., without regard to the conditions under which pictures of the event are taken. Inasmuch as circumstances may not be conducive to the best sound recording results, RCA cameramen may get their pictures in the usual way while the sound effects are cut in on an A. T. & T. wire and carried directly to the Schenectady laboratory. Since the A. T. & T. network of wires practically blankets the country, sound transmission of this sort is practicable from even the most out-of-the-way places.

Pictures of an event in San Francisco could be taken in the usual way, the sound effects transmitted over the wire to Schenectady where the sound film would be developed and made ready for joining to the ordinary film which might be developed on its way across the country.

To Issue "Talkie" Handbook

The Electrical Research Products Co., Inc., is shortly to issue a book of instructions covering Vitaphone and Movietone which will be distributed free on request throughout the country. In addition, a special book of instructions will be given along with the installation of these synchronizing devices.

The general book will be ready within the month. Projectionists desiring a copy may secure one by writing direct to Electrical Research at 250 West 57th Street, New York City, or to the offices of **THE MOTION PICTURE PROJECTIONIST** which will forward these requests. Either way will assure prompt delivery.

Projectionists everywhere should avail themselves of this opportunity of familiarizing themselves further with talking pictures.

Switch Notes

In case the jaw or hinge blades are out of line they may be tapped with a machinist's hammer using a fibre block against the switch so that the copper will not be marred.

Check the switch contact with a .001½-inch feeler. If the jaw blades are not parallel, they should be twisted into parallel position.

If there is an outward bow in the jaws, the blade of the switch is pulled out as far as possible and the jaws straightened by striking lightly with a rawhide hammer.

If there is any inward bow in the jaws, it is straightened by inserting a round pin between the jaws, then squeezing the ends of the jaws together with a pair of gas pliers with protected ends so that the copper jaws will not be marred.

Movietone Optical System

By FOX-CASE ENGINEERING STAFF

THE settings of the slit and optical system used in picking up the sound from the film are very precise. Accordingly, the expedient has been adopted of making them carefully with a special microscope and then sealing the screw controlling the adjustments so that they will remain permanently correct. This assures proper operation at all times.

It is not because any need arises for the projectionist to adjust these parts that this description is written. Indeed it is very important that he should never disturb them. It is rather to explain the relation of slit and lenses to satisfy a natural curiosity concerning this particular optical system.

The source of light is the straight coil filament of the sound lamp and in ideal form is a line source rather than the point source that would be ideal for picture projection. In the figure this would be a line perpendicular to the paper at the point indicated.

Slit Covered Fully

The light passes through a condenser and is brought nearly to focus on the slit, covering this slit much as light from the arc covers the aperture at the picture gate. A side window is fitted in the barrel of the assembly so that the operator can see that the light from the filament covers the slit properly at any time he is adjusting the sound lamp.

The slit is formed by two carefully set knife edges and in the diagram it would be perpendicular to the paper at the point shown. The height of the slit opening is .0015 inch, and the light is cut off sharply and cleanly by its edges.

An image of the slit is then projected onto the sound track of the film as it passes through the sound gate, and the objective lens combination is such that the projected image is a $1\frac{1}{2}$ to 1 reduction, rather than an enlargement, as in picture projection.

The reduced image is then .001 inch high, which is sufficiently small to give sharp definition on the fine sound lines. The width of the beam is cut down at the aperture plate in the sound gate to .080 inch, which is slightly smaller than the width of the sound track on the film.

The sharp wedge of light passes through the film and it is absorbed according to the density of the sound lines as they run through the beam. Passing into the photo-electric cell this light causes the varying electric current that is amplified for the loud speakers.

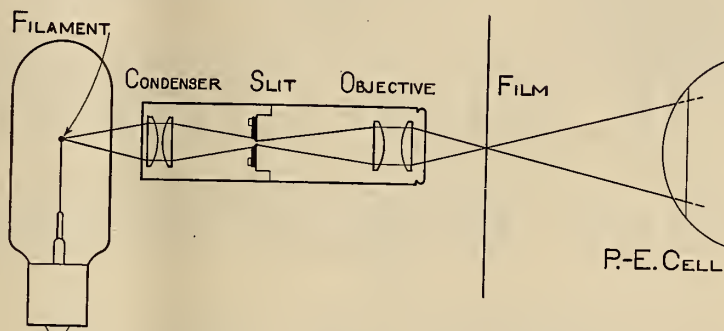


Diagram of optical system for Movietone Sound Pick-up.

Precision Necessary

If the slit image projected on the film is not exactly right, it is obvious that quality of reproduction must suffer.

A lengthwise movement of the unit from its correct position will throw the image out of focus, increasing its size and blurring its definition. Such an image will not allow the very fine lines and overtones to be picked up clearly and in full strength, but will slur over them by covering both light and dark spaces at once. Even the broad lines will not be faithfully reproduced due to a change in the wave-form of the sound.

If it is rotated out of its correct position straight across the sound track it will

likewise slur over the fine markings and the broader ones will be picked up incorrectly.

Proper Care

It can readily be seen that the position of the slit and lens assembly must be accurate and must remain so. Neither axial nor rotational movement can occur without ruining sound quality, and the best safeguard is to clamp the unit in place and seal it against displacement.

The setting of this vitally important unit requires special equipment and extensive experience and once correctly set it should remain so indefinitely. Therefore, so far as the projectionist is concerned he should understand it, appreciate it, and treat it with due care and respect.

Use The Finger Test

SOME projectionists do not make the best possible test to ascertain whether or not the sound is percolating properly in the amplifier equipment. Instead of making the more reliable "finger test," many projectionists are in the habit of listening for the microphonic tube noise from the horns.

A very much better way is to move the finger up and down through the light beam where it enters the photo-cell at the projector. No film should be in when the test is made and the sound gate should be out of the way.

The tubes must, of course, all be switched on, and the fader turned part of the way up to get sound from the horns. This test not only checks-up from the main amplifier forward to the horn, but also it checks the photo-cell, the sound attachment and the fader as well.

Tapping the first tube will sometimes apparently show everything to be "O.K.," yet the sound will not "perk" through by reason of some fault back of the 8-B panel. The finger test has been demonstrated to be conclusive because it really checks

through on the whole system. It cannot be too strongly urged, therefore, that this method be given preference, except with the film itself.

Tapping Very Deceptive

An inadequate test is in one way worse than no test at all, because it may prove deceptive and give rise to a sense of false security. Should something go wrong, the projectionist who has relied upon a test which really has included only a part of the system will be at loss as to just where the trouble lies and consequently will be unable to apply corrective measures.

While projectionists in general are careful to apply the finger test on the equipment, there are a few who persist in employing the tapping method, for just what reason is not apparent. "Letting it go for this time; catch it next trip" probably is the main reason for negligence in this respect. It is entirely probable, however, that a few mishaps will bring about a general correction of such lapses.

Use the finger test. It is the safest and best rule.

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Cleveland, O.

Strong Change-Overs Are Popular

The Strong Electric Changeover and remote control system has been installed and is in use in more than 2,000 theatres in this country, according to an announcement made recently by L. D. Strong, President of the Essannay Electric Mfg. Co., which markets this device.

"These devices allow the discarding of the old unsightly strings, wires, rods, etc., which were used to make the old slip-shod changes," said Mr. Strong, "and substitute a method whereby a change is made that cannot be noticed by the audience, allowing the picture to be projected without annoying interruptions. Every projectionist who wishes to improve the standard of projection should insist on an automatic changeover."

Strong Changeovers are made in two sizes, the smaller size having a 3 inch opening and the large de-luxe having a 5 inch opening. Both sizes consist of a panel box that is mounted over the port opening and through which the picture is projected. In making the changeover the projectionist steps on the switch, which opens the aperture of the changeover device on the starting machine and closes that on the machine which is finishing.

With these devices it is possible to equip a battery of three machines, a double stereo, and a double-effect machine and to go from any one machine to another, instantaneously, without making a previous set-up.

Complaint Dept.

(Continued from page 11)

that we have a place to speak up, and where speaking up means more than just words, I look for an improvement in film conditions.

Both of the above complaints were referred to the Home Office of the company concerned, where promises were forthcoming of a thorough investigation and report on each case.

It is likely that the cases will be referred directly to the Branch Manager from which the defective film was issued, and an improved standard of inspection is almost certain to be the result.

Cooperation Essential

The Motion Picture Producers & Distributors of America, of which practically all the film companies are members, has a Conservation Dept. which maintains a close watch over film conditions throughout the various exchange centers, and conditions of the sort outlined in the above complaints will not be tolerated.

This response to the establishment of the Complaint Dept. is most encouraging, and participation in the activities of the department by all projectionists is urged. The promise of immediate steps to correct the bad film nuisance is repeated, but the cooperation of all projectionists in the work of the department is necessary to a vigorous prosecution of the campaign to better film conditions.

Week Off with Pay

CONSIDERABLE interest has been aroused in projectionist circles by the success of Toronto, Canada, Local Union 173 in securing for a large majority of its members a week off with pay this summer. Local 173 is proudly pointing to this feat as an indication of its progressiveness in securing better conditions for its members.

Participating in the plan are the Famous Players' Corp. of Canada, which employs 42 projectionists in the Toronto district; the Loew Theatres, and several independent houses. The theatres subscribing to the plan will not be closed during the vacation periods, arrangements having been made for relief men to fill the posts.

Local Enforces Promise

It is understood that the agreement to allow the vacation with pay was reached by the Union and exhibitor representatives during the wage scale negotiations last Summer, the vacations being promised in consideration of a satisfactory agreement reached on the wage scale.

The matter was kept under cover during the winter months and it was not until late this Spring that the Union sought to press action on the case. Exhibitors were at first reluctant to keep their promise in the matter, the plan being announced as acceptable only to be revoked almost immediately. However, the Union insisted upon the promise being kept, and the exhibitors finally acceded to the demands.

International Vice-President William J. Covert in announcing agreement on the vacation period said: "This is one of the best concessions we have received in years."

Local 306 Moves To Fine New Quarters

Local 306, New York City, has moved into new headquarters this month, taking possession of an entire floor in a new office building at 125 West 45th Street in the heart of the Times Square section. The move was made necessary by the rapidly changing conditions of the industry which have thrown the craft into the midst of the big powers which will form and guide the growth of the motion picture business for the next decade.

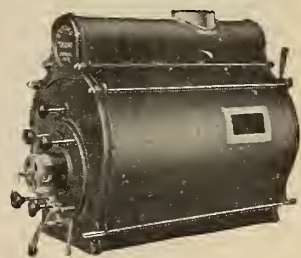
The floor has been subdivided into offices, one for each of the officials. One of the features of this new arrangement is a large executive board room that would do credit to the largest corporation.

Another is the members' room which occupies most of the floor space and which has been outfitted with every convenience. The faithfulness with which the committee in charge undertook the most minute details is evidenced by two blackboards in the members' room fitted into the wall on which projection problems may be worked out.

All of the offices are supplied complete throughout with new furniture of one tone.

Tom Maloy

of Chicago Local No. 110
Says



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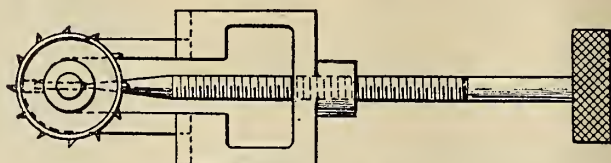


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RCA Projector Rumored

It is rumored in New York, although it could not be substantiated, that the Radio Corporation of America is now working on the designs of a new projection machine. This, if true, means the entrance of another big manufacturing factor into the motion picture industry, one with tremendous financial resources and engineering abilities.

It is probable that the idea of making a projector originated in the necessity

these talking picture companies feel for a projector that will carry their synchronizing apparatus as a unit—that is, they may wish to market not an attachment foreign to the design and the original purpose of our standard projection machines but a complete apparatus in harmony throughout.

An interesting development along these lines will shortly be announced by the Electrical Research Products, it is understood, which has similar ideas. Electrical Research does the recording and the installation of Vitaphone and Movietone films and apparatus but has nothing to do with the selection of the subjects or with the sale of the films.

Electrical Hints

Voltage transformers are used with voltmeters, wattmeters, watt-hour meters, power factor meters, frequency meters, synchrosopes and synchronizing apparatus, protective and regulating relays and no voltage and over-voltage trip coils of automatic circuit breakers. One transformer can be used for a number of instruments at the same time if the total current taken by the instruments does not exceed that for which the transformer is designed and compensated.

A New Condenser

A NEW condenser, the invention of Dr. Maurice W. Ashman, of New York City, has been installed in the Roxy Theatre and has occasioned no little interest and favorable comment in projection circles. The condenser is the result of 12 years of experiment and research by Dr. Ashman, who became interested in projection lenses through his work as a practicing optometrist of long experience.

He perfected a formula which was submitted to the Department of Physics at Columbia University and to the U. S. Bureau of Standards, both of whom concurred in the opinion that the new condenser was very effective in the projection of motion pictures.

While specific data on the Ashman condenser is not now available, its term of use at the Roxy Theatre would seem to indicate that it approximates the quality claimed for it. The condenser is now ready for the general market and a comprehensive report on it will be given in these columns in the next issue.

More Effective Picture

The new condenser absorbs harmful rays of light the while retaining clear visibility properties of all good projection lenses, according to Dr. Ashman.

One of the first to recognize the value of the Ashman condenser was S. L. Rothafel ("Roxy"), who had all his projectors equipped with them. After several weeks of usage and comparison with other condensers, the Roxy reported that the new condenser materially softened and reduced the glare of light and that in future this condenser would be standard at that theatre. Roxy paid Dr. Ashman high tribute when he wrote him that ". . . after a very critical test I find that your condensers are a great advantage over the old form—the picture becomes more effective, and the reaction to the eyes is indeed restful.

"It offers what I always wanted—quality light, instead of quantity, and I highly recommend their use wherever perfect projection is sought."

Also enthusiastic about the new lens are Art Smith, Chief Projectionist at the Roxy; Hall & Connolly, makers of high intensity lamps, and many others in the projection field. Dr. Royal M. Copeland, former Commissioner of Health for New York City, also endorses the use of the Ashman condenser.

Notice

Owing to the heavy demand by late subscribers for back copies of **THE MOTION PICTURE PROJECTIONIST**, the supply is exhausted. New subscribers must not expect their subscriptions to become effective earlier than the date on which they are sent in.

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- What is a Compound Wound Motor?
- What is a Series Wound Motor?
- What type of motor is used on projectors?
- What is frequency?
- What are the advantages of the synchronous motor?
- How do you measure the speed of an intermittent movement?
- How would you locate a break in an armature of a generator?
- What will cause an armature to overheat?

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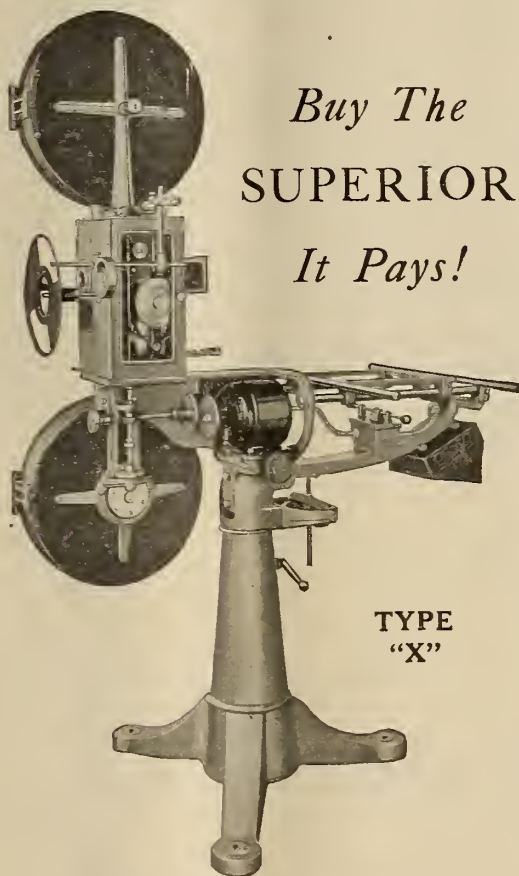
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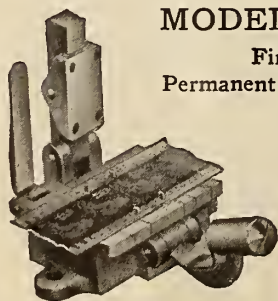
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New Press Wins Favor

Projectionists have enthusiastically welcomed the new intermittent sprocket and pin press now being marketed by the Projection Improvement Co., Drifton, Penn., according to an announcement by that company which states that the ready response of projectionists to their device far surpasses their early expectations.

This new pin press is the invention of Morris Finkel, projectionist, who is a member of Local 152.

There are a few such presses already on the market, but the Projection Improvement Co. asserts that their product, in addition to being more flexible in its application, is adaptable for use on a Powers machine, something impossible heretofore. This new press may be used on Powers as well as all other makes of projectors.

Varied Uses

The necessity for the projectionist having to replace worn intermittent sprockets with the aid of a steel-punch and hammer, the use of which is very injurious to the intermittent, is completely eliminated by the Finkel press. It enables the projectionist to replace any part of the intermittent properly, retaining it perfectly true, with a resultant perfectly steady picture on the screen with the repaired movement.

To projectionists who are not called to make repairs to their projectors, this new device is also very useful inasmuch as it can be used to tighten up taper pins holding intermittent sprockets which may loosen up in the course of projection. This may be accomplished with this new press in a fraction of a minute while the other projector is in operation, without the necessity of removing the intermittent movement from the mechanism or the removing of any part of the mechanism of Power's projectors except the aperture plate and lower apron. The intermittent movement is thus retained perfectly true and the continuity of a steady picture projected on the screen is also insured.

New Brenograph

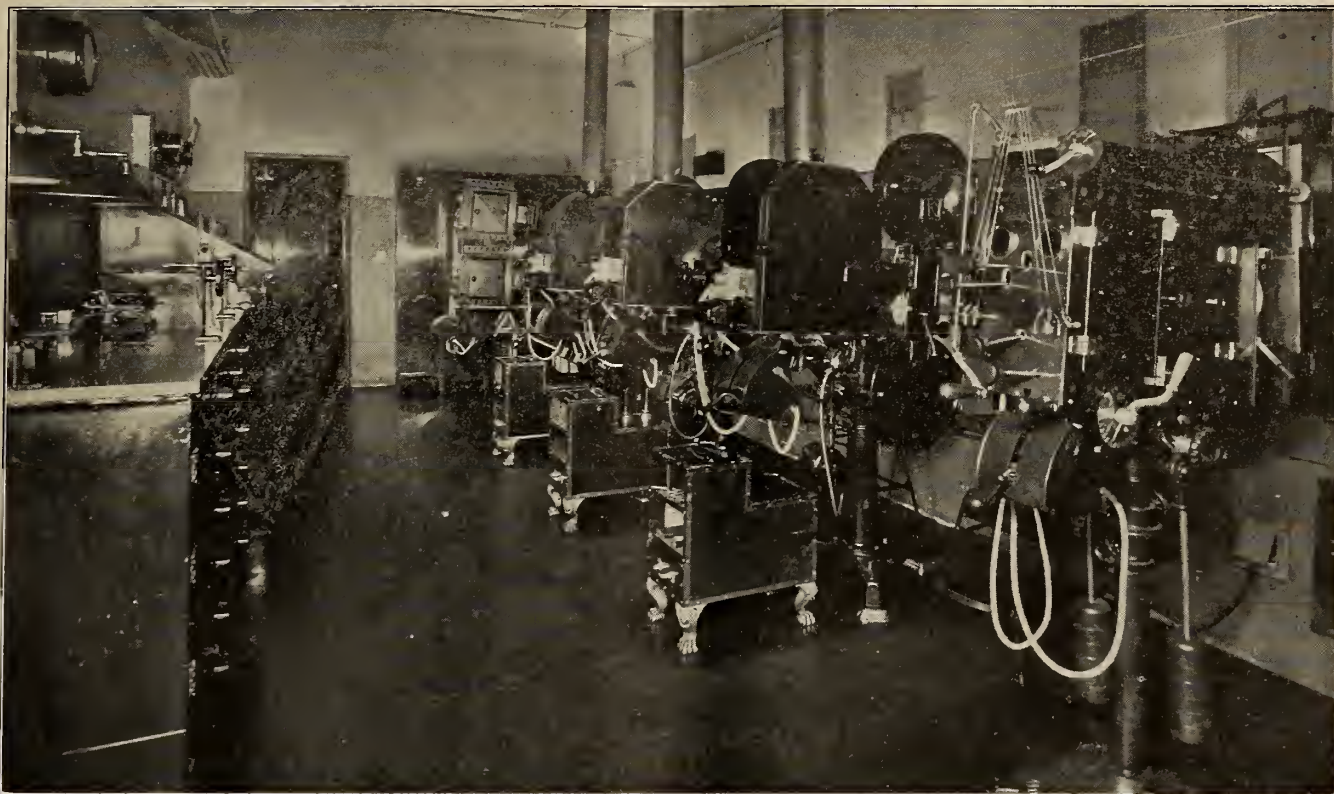
(Continued from page 8)

that the trial installation was made permanent.

Brenkert has available a complete line of animated scenic and color effects which are adaptable to the Master Brenograph in addition to special stationary scenic effects which were devised for making quick changes of stage scenes by the projection method. All of these effects have been priced especially low in order to make it possible for the theatres to purchase them outright.

Simplicity of operation is a feature of the Master Brenograph. Each lamp is equipped with an automatic arc control to relieve work in this respect and enables the projectionist to devote all of his time to projecting effects.

Standard equipment on the Master Brenograph includes arc controls for each lamp, one spring driven color wheel, a set of special glass effect plates, and two framing and two iris shutters, each of the preset type. The standard finish will be black enamel, baked on, with nickel trimmings.



A comprehensive view of the Publix Metropolitan Theatre (Boston) projection room. Thad Barrows, President of Boston Local 182, is Projection Chief at this theatre and personally supervised the layout, construction and equipping of this room which is considered one of the finest in the world.

New Kaplan Pedestal

A new 5-legged pedestal is now being manufactured and marketed by Sam Kaplan of New York City, being an important addition to the already extensive line of equipment sponsored by him.

The new pedestal has been designed and manufactured with an eye to absolute rigidity, perfect balance and general durability. Tests made privately before announcement of this new product was made proved conclusively that the pedestal would

fulfill, if not surpass, early expectations of its quality.

The addition to the pedestal base of two supporting arms is expected to materially improve the general stability of the base and to make for absolute steady projection. Vibration problems are successfully overcome by the design of the base which, while covering no greater area than usual, is said to overcome this troublesome factor. The pedestal is now ready for general distribution.

Movietone Canadian Agent

Northern Electric, Ltd., a subsidiary of the Western Electric Co., will handle Movietone installations and service in Canada, according to a recent announcement of the latter company.

Northern Electric, Ltd., will act very much in the same capacity as does Electrical Research Products in the U. S.



New Kaplan Pedestal

Editor,

M. P. PROJECTIONIST.

Sir: I would like to take this opportunity of saying that, in my opinion, THE PROJECTIONIST gives more of the really necessary information to members of the profession than any other book or magazine I have read.

Continue as you are doing and your success is assured.—JOSEPH W. LIPMAN, Bronx, New York.

Port Arthur Local 391 Elects 1928-29 Officers

The entire Executive Board of Local 391, Port Arthur, Texas, was re-elected for another year without opposition at a meeting of the Local following the International Convention at Detroit.

The board consists of President J. W. Sipole, J. J. LaBarthe, Vice-President; R. D. France, Business Manager; Arthur A. Derrough, Secretary-Treasurer; and E. Tucker.

The re-election of the Executive Board for another term reflected the confidence of the membership in the work of these officers during the past year.

Arc Lights

The light emitted by any heated body increases with its temperature. The temperature of the carbon in the crater, when in a state of ebullition, is about 3500° C., this being the hottest portion of the arc and consequently the point from which the most light is emitted.

About 12 per cent. of the energy supplied to an electric arc appears as light, the balance being represented by the heat evolved. About 85 per cent. of the light emitted from an arc lamp is reflected from the crater, the maximum illumination being in a zone surrounding the lamp at an angle of about 40° to the horizontal.

The Strong Rectifier

THE Strong Arc Lamp Rectifier is comprised mainly of a special transformer, for changing the alternating line voltage to a potential correct for operation of the arc; a radial switch for regulating the current to the desired number of amperes, two rectifying tubes for rectifying the current, a substantial housing, and the necessary sockets, lead wires, etc.

The transformer is of the modified core type, designed to possess constant current characteristics, thus allowing commercial fluctuations of line voltage without affecting the stability of the arc. The primary and secondary coils are separate and are effectively insulated from each other, which construction allows only the low voltage necessary to operate the arc to enter the lamp house—a factor which adds materially to the construction costs but which is entirely justified by the improved performance and safety element. Liberal proportions of high silicon steel and cotton covered enameled magnet wire, thoroughly impregnated and well-insulated throughout, form a well-proportioned unit.

Economy and Efficiency

Two thermionic tubes filled with argon, an inert gas, at low pressure and working well within their rated capacity provide a valve action, and these tubes are so connected that full wave rectification is secured without the use of moving parts or intricate mechanism.

The radial switch is within convenient reach of the projectionist and is connected to eight taps on the primary of the transformer. This provides adjustment of current from 15 to 30 amperes for the large and from 10 to 16 amperes for the small rectifier.

The efficiency of 80% attained with Strong Rectifiers, the saving in current is

considerable. For example, when using 14 amperes at the arc, only one kilowatt is taken from the line; or in a large theatre which uses 21 amperes, only 1½ kilowatts are used. It is estimated that the average cost of operating the arc for one hour is but six cents.

Ventilation by means of air draughts through the large unobstructed ducts, underneath and adjacent to the sides of the transformer, past the tubes and through the perforated metal top and sides of the housing, effectively dissipates the heat, insuring maximum efficiency of operation.

Maximum Convenience

The installation of Strong Rectifiers is particularly simple, as they are furnished in single lamp capacities to suit the individual need. This makes it possible to build units small enough to be placed in a corner, or on the floor directly under the projector, where they may readily be connected to the present wiring by means of lead wires which are furnished with the rectifiers. The rectifiers may be interconnected by means of double-throw switches, so that direct current is always available in an emergency. The combined output of the two rectifiers may also be switched into one single spot lamp requiring 30 amperes or more.

In appearance Strong Rectifiers are graceful as well as practical and sturdy. All parts are accessible, although completely enclosed by the side plates, which also serve to securely clamp the transformer core stack so tightly as to render it absolutely noiseless in operation.

Strong Rectifiers have been inspected and tested by the National Board of Fire Underwriters which lists them as standard, as do various other local bureaus including those for New York and Chicago.

Electricity as an Aid to the Human Body

IF electricity can have performed so many remarkable services in lightening labor, if it can have raised the standard of living throughout the world, must we continue to say that it is impotent in repairing human bodies and in keeping them in repair?

Not for long, certainly. Electrotherapeutics has passed the stage of charlatanism and magic and has settled down to sober and honest progress. The alluring but entirely fictitious powers of "electronic reactions" and all their breed have been exploded and electricity has at last taken an active hand. Chemistry, once the only reliance of medicine, has a new and powerful ally whose purpose, like that of its colleague, is sound investigation and reproducible results. Ultra-violet light from electrical sources, far more powerful than sunlight and yet more controllable, has already gained a substantial reputation in medicine.

New Applications

These two—ultra-violet light and X-rays—are already firmly established. But there are other electrical phenomena that may soon serve the doctor in his fight for men's bodies. High-frequency currents, whose curative power has been in dispute for years, are now being suggested in medical circles as a possible means of aiding natural convalescence by producing artificial fevers. And recently has come the announcement of the cathode-ray tube, which can produce many hundred times more radiation than is given off by all the radium in the world and, unlike that rare metal, is under perfect control.

These are a few of the contributions and promises which electricity, turning from the remodeling of industry, has made to man himself.—*Electrical World*.

New Brenograph Shown at New York Meeting

The Kaplan Projection Society and The Manhattan Projection Society, both of Local 306, New York held a joint lecture meeting on Tuesday night, July 10th, at which the new Brenkert "Master Brenograph" Effect Projector was demonstrated in detail by Mr. John H. Kurlander, engineer of the Brenkert plant.

The hall was decorated for the occasion and refreshments were served after the lecture.

The entire 306 membership was present and the lecture was opened by short addresses by President Sam Kaplan and New York Business Representative Simon Terr, who is head of the Manhattan Projection Society. Brooklyn Business Representative Jimmie Lefante, president of the Kaplan Projection Society, presided.

Mr. Kurlander gave a very interesting talk, going into the details of the new apparatus and followed this by an actual demonstration of the Brenograph.

"Synchro-Film" Makes English Debut

Editor Addresses Bridgeport Local No. 277

Boone Mancall, Editor and Publisher of THE MOTION PICTURE PROJECTIONIST was guest of the officials and members of Local No. 277, Bridgeport, Conn., on Saturday evening, July 14th.

The whole Local membership was present and after a short business session the evening was turned over to a discussion of problems of Projection and the Projectionist, particularly in the light of synchronized pictures. Mr. Mancall gave a talk in which he outlined the situation as regards sound pictures, detailing what the different sound apparatus manufacturers were doing and how best the members could cope with the new condition in the industry. President James V. Fensore presided at the meeting, ably seconded by Secretary Peter Bernard.

Developments in the exploitation of "Synchro-Film," the gramophone device by which, it is claimed, cinematograph film projection and sound reproduction can be synchronized, are imminent in England, according to a report of American Trade Commissioner at Paris, George R. Canty, made public by the Department of Commerce on July 17. The full text of the statement follows:

In this invention the projection apparatus is described as being controlled by the gramophone unit, the two elements starting, slowing or stopping in precise unison. The slightest tendency towards loss of synchronization is said to be automatically adjusted. The drive is from the gramophone, through a ratchet-wheel keyed to a spindle carrying a toothed wheel having an internal screw thread.

Film break during projection brings the apparatus to the stop, and film shortage consequent upon rejoining is automatically adjusted in the synchronization it is said. The apparatus may be used in connection with any make of gramophone, and control being electrical, can be near or remote, as desired.

Sentry Safety Control

Rivoli at Belmar, N. J., had fire and operator George Bootel averted panic by closing up the booth and was burned about the face and neck.

—From the Business Brevities column in the Film Curb, a New York regional.

The projectionist averted panic by risking his own life.

How much better for him and the audience if the theatre-owner had taken precautions to make that film-fire impossible.

Such risks are preventable. SENTRY SAFETY CONTROL cancels them absolutely.

Projectionists serve their Craft by specifying SENTRY SAFETY CONTROL as necessary equipment.

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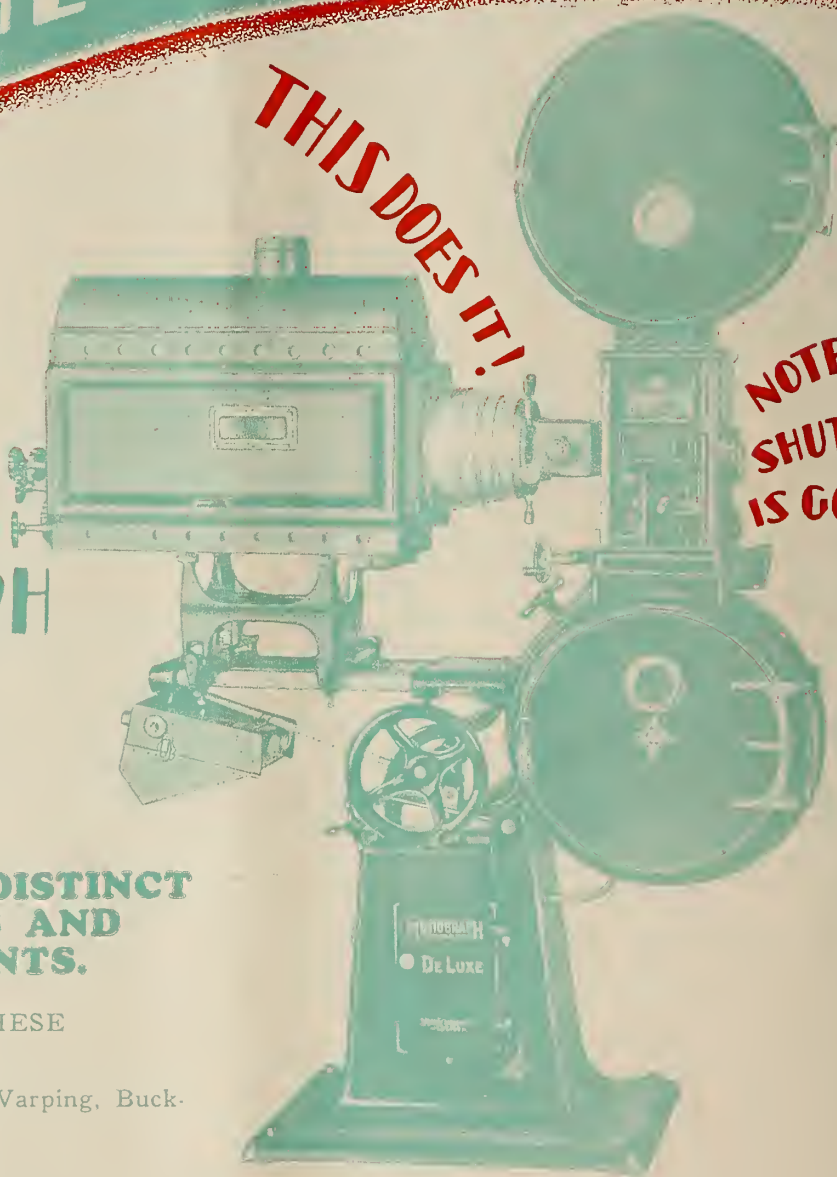
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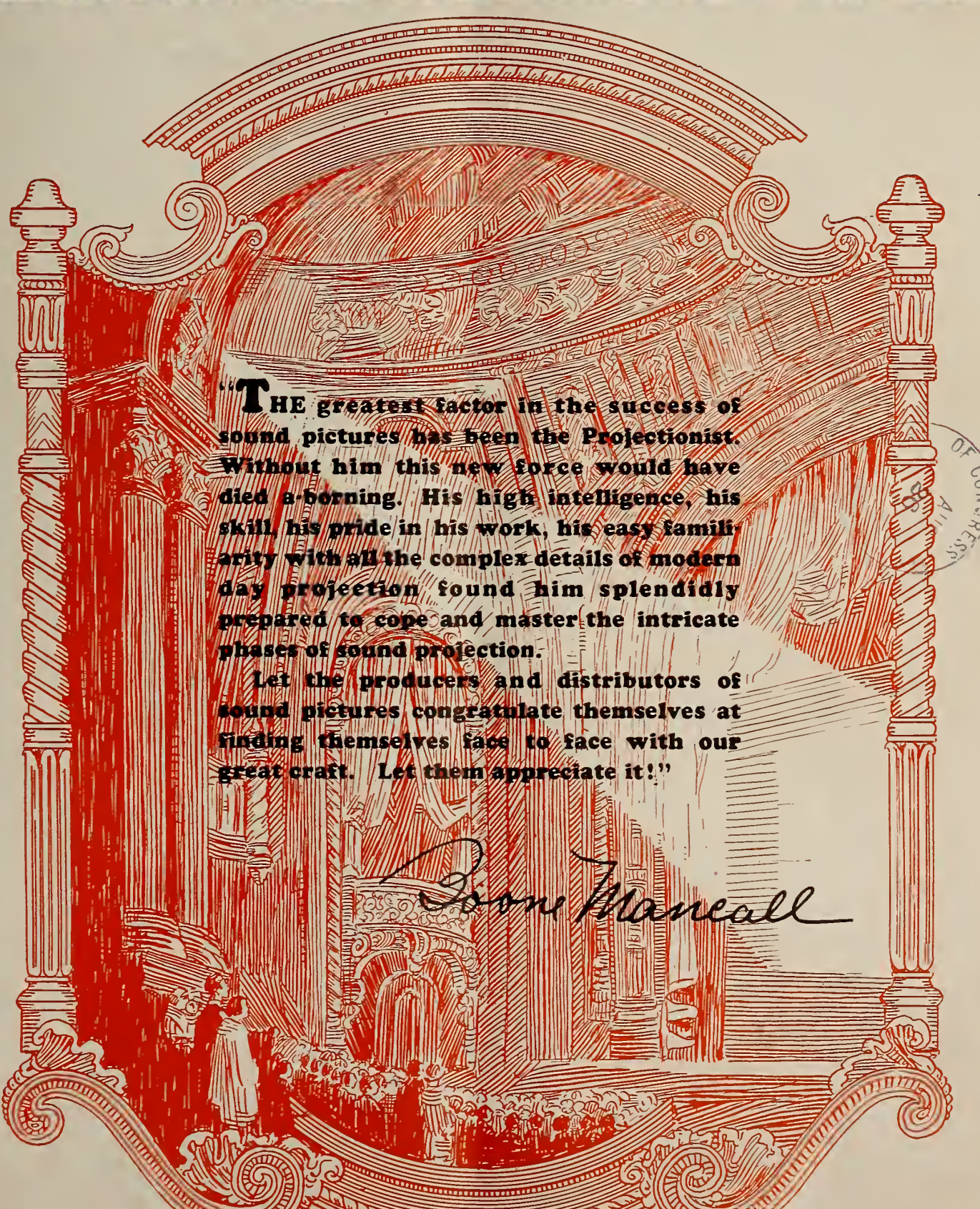
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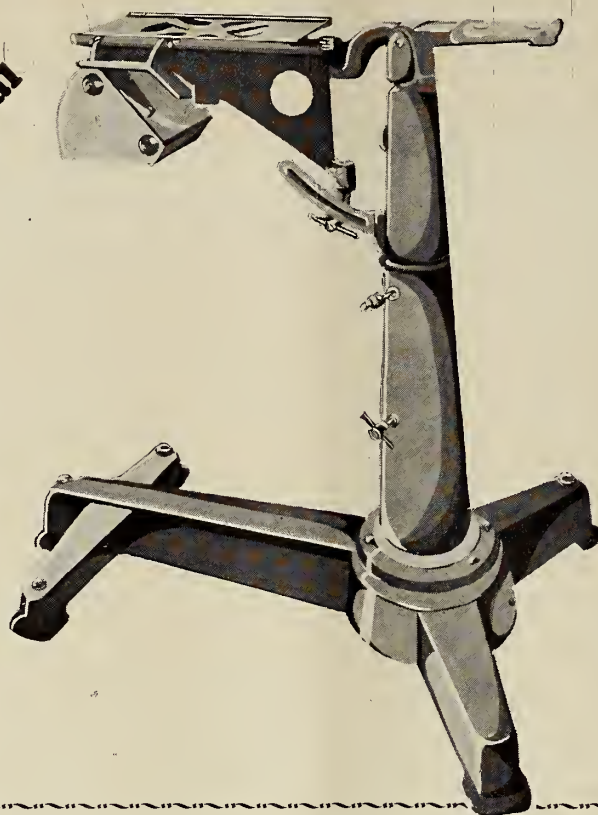


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T H E MOTION PICTURE PROJECTIONIST

AUGUST, 1928 The Motion Picture Projectionist, 45 West 45th Street, New York Vol. I—No. 10

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Britisher Invents New Fire Control Device

Chief Inspector Wells of the Huddersfield Borough Police Force, (Great Britain), who has been making preliminary experiments on an appliance for preventing films from catching fire whilst being projected, has now completed his invention and has demonstrated it in Huddersfield. The demonstration was made on an Ernemann projector and was carried out without a hitch.

Chief Inspector Wells set light to the film as it was in motion, allowed it to get well alight, and then released the catch which operates the device. The result was that the film was severed instantly and simultaneously at the traps of both spool-boxes, which were automatically closed. Only about 18 inches of film is thus allowed to burn. Whilst the short length of film was still burning Chief Inspector Wells applied a flame to the traps of both spool-boxes without the film inside being in any way affected, the box being tightly closed.

The inventor's attachment embodies a slide which is fixed to the traps of both spool-boxes. To the moving portion of the slide is attached a sharp cutter, which works across the mouth of the trap. When not in use the cutter is secured so as not to interfere with the smooth running of the film. It is connected with the small release lever by Bowden cable, and in the event of the film being ignited, the projectionist needs only to touch the lever to release the two cutters and close the boxes.

Chief Inspector Wells guarantees that there can be absolutely no chance of fire or damage to more than 2 ft. of the film.

The Birth of 659

The rapid advancement in organization of the California cameramen with a membership of 419, has drawn to a close the paternalistic efforts of Local No. 644, Hollywood, which on and after August 1st was instituted as Local No. 659, I. A. T. S. E., with offices at 428 Markham Bldg., 6372 Hollywood Blvd., Hollywood, Calif.

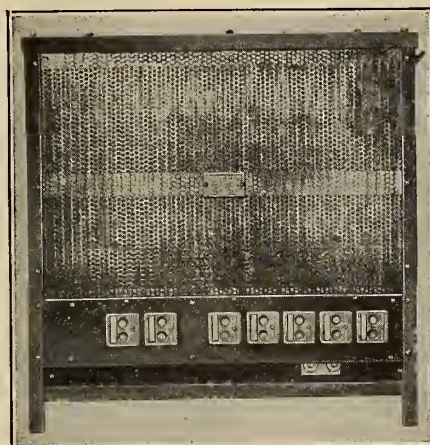
As a babe outgrown its swaddling clothes, so has this body of artists, united for the one purpose of bettering the conditions of the cinematographer in his daily work, outgrown the small efforts of Local No. 644 to render every possible service to the West Coast brothers. The intervening distance of over three thousand miles presented a problem beyond the ability and resources of this local to handle and it was decided that a separate organization functioning independently was the only solution.

German Paper Film

Announcement has been made in German film trade papers of the invention by an unnamed Berlin engineer of a process for manufacturing camera films from paper. It is claimed that the film possesses the same sensitiveness to light as a celluloid film, is expected to cost considerably less than any film now on the market and is warranted absolutely fire-proof.



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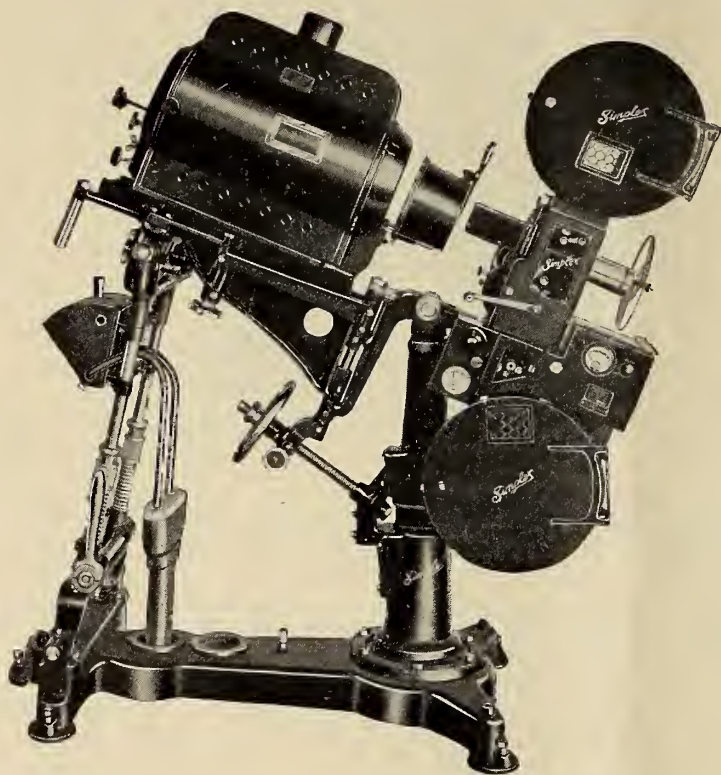
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How Light Ticks off Photographs to Millions*

By PROFESSOR C. M. JANSKY

*The world is so full of a number of things,
I'm sure we should all be as happy as kings.*

I DO not know who imagined that the happiness of kings was more prevalent and of a higher order than that of the ordinary man whose enjoyment of the magical things is not dulled by ennui and satiety. What experience of the king is more thrilling than that of the small boy who after combining a few coils of wire, some condensers, resistors, batteries and a telephone receiver, hears the nominating speeches from Kansas City and Houston?

To him the thrill is more exciting than the magician's performance of pulling rabbits out of a silk hat. In spite of the fact that radio has claimed the attention of the public for nearly ten years, many an older boy is still puzzled, bewildered and even amazed at the feat of picking music and speeches from the air. If plans now being carried out succeed, even European citizens have heard the equivalent of Alabama cast her 24 votes for Underwood, and nearly everyone has asked the question, how did they do it?

The apparently miraculous performance has convinced many, if not all, that everything is possible and this unquestioning and uncritical attitude of the public has been the opportunity of the quack in medicine, in science and in industry. We thus hear and read of cures by electronic vibration; of fuelless motors and of schemes for communicating with Mars. We need not be surprised if soon some magician does not reproduce for us, for a consideration, out of the void, the likeness of our beloved dead.

Misconceptions Prevalent

The quack will undoubtedly be with us as long as credulity and ignorance exist. Magical things will continue to be produced, electronic vibration cures may later be performed, but these will be in accordance with well established physical laws and not by a charlatan's incantations.

This long and apparently irrelevant introduction is the result of an article on the identity of sound and light that I recently read in a reputable musical journal. One would think that musicians above all others would know the difference between vibration frequency and wave length, but the article showed that both the author and editor were sublimely ignorant of the meaning of words now used in every household where radio provides the evening's entertainment.

As these terms, vibration frequency and wave lengths are persistently used in any and every discussion of communication by

THE accompanying article is a clear and forceful presentation of the principles of television by Professor C. M. Jansky, noted authority on the subject. Progress in the television field has been so rapid within the past few months, what with predictions being freely made that the ensuing two years will see the introduction of the science into the amusement world, that projectionists will find much of interest to them in Professor Jansky's article.

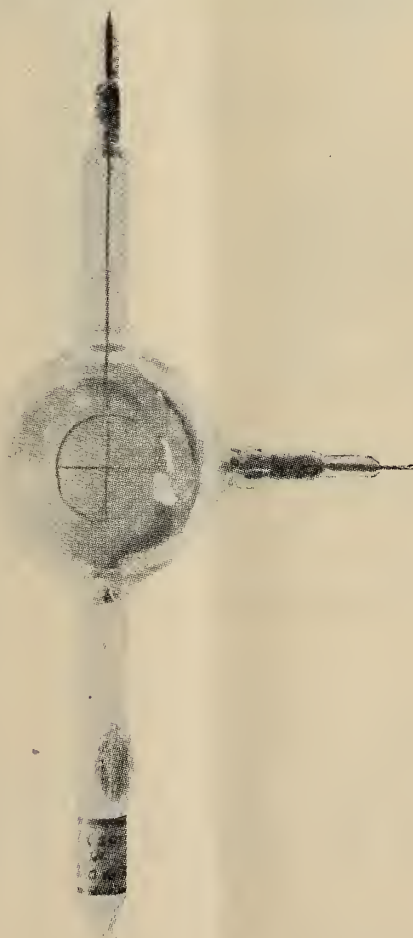


Fig. 1—A Quartz-Potassium Cell by Kunz.
Diameter of bulb, 51 mm.

radio waves, let us have a glance at them again so that every reader of these articles may have an understanding of these important terms.

It is true that the laws of propagation of energy from the broadcasting station to the receiving station are not known with

mathematical exactness, nevertheless, the commonly accepted theory is that the energy is propagated by waves. What these waves are is now a matter of discussion. No matter what their form, it is accepted as a fact that these waves are caused by electricity moving back and forth with an extremely high speed in an electric circuit.

When the electricity moves in one direction, a pulse, surge or influence of one sort is set free; and when the electricity moves in the opposite direction a reverse pulse, surge or influence follows the first. These two pulses, one positive and one negative, constitute a wave length. The number of these wave lengths set free per second is called the frequency of the electricity oscillating in the circuit. It is obvious that the frequency of the wave is the same as that of the oscillating electricity producing it.

The wave length is another quantity. It is the distance in space between the beginning of a positive pulse and the end of the negative pulse immediately following. This length can be easily calculated if the speed of the wave and frequency are known. The speed of an electromagnetic wave is the same as the speed of light—185,000 miles or 300,000,000 meters per second. The wave length is therefore the distance the pulse travels or moves during one oscillation of the electric current to which the wave is due. Wave length therefore is equal to the speed of the light divided by the frequency. Thus the wave length of pulses produced by an oscillatory electric circuit whose frequency is 1,000,000 per second is 982 feet or 300 meters. The higher the frequency the lower or shorter the wave length. This relation must be kept in mind if radio communication of any sort is to be understood.

Principles Involved Reviewed

It has been shown that radio communication was accomplished by first setting up a train of waves of high frequency and short wave length—called the carrier wave—and then impressing upon this wave others whose intensity and frequency varied with the intensity and frequency of the speech or other sounds that are to be transmitted. The operation is one of changing the form or modulating the carrier wave to conform in outline to the sound wave. This modulation in radio telephony is easily accomplished by means of the ordinary telephone transmitter properly connected to the circuit. At the receiving end the modulating wave is picked off, figuratively speaking, and the sound is reproduced.

A similar reciprocal process is necessary

(Continued on page 9)

* Electrical Workers Journal.

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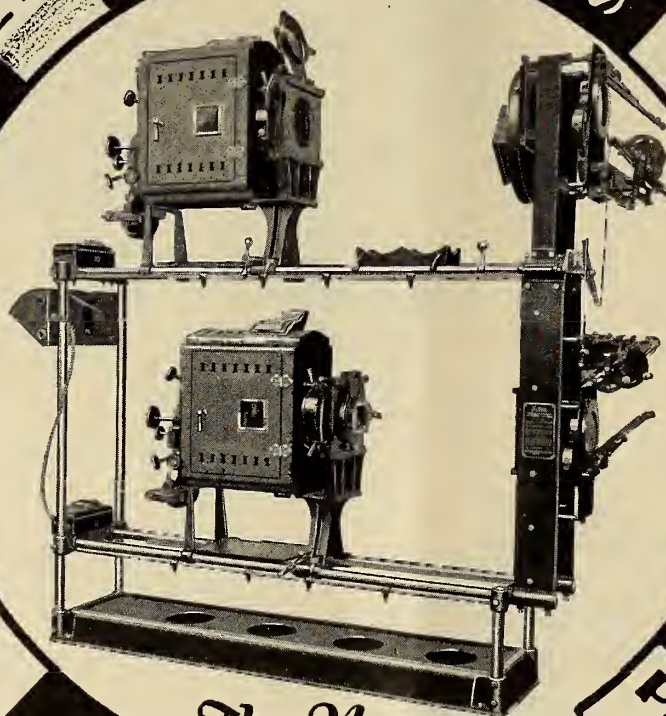
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for the transmission of any influence by radio. First there must be some means of impressing upon the carrier wave other waves whose form is determined by the thing to be transmitted and at the receiving end there must be some means for picking off this modulating wave.

In television or telephotography, that is, transmission of vision and of pictures by radio, the actuating agency is varying intensities of light, and the first problem that confronted the physicists and engineer was to find some means by which a fluctuating or varying intensity of light would produce fluctuating or varying electric currents.

We see the details of a picture by the different intensities and frequencies of light that it reflects to our eye. The dark part of a picture reflects less light than the light or white part and the red portion reflects light of different frequency from the blue portion, etc. The problem, therefore, is to use the light reflected or transmitted through a picture to vary an electric current as the intensity of light varies. How has this problem been solved?

The Selenium Cell

It has been known for a long time that certain substances such as selenium changed its electrical resistance with light. If selenium be interposed between the terminals of an electric circuit which includes a source of electromotive force, the current through the circuit will vary with the illumination or intensity of light falling on the selenium. Such a combination of selenium and conductors is called a selenium cell. Eureka! here we have a means for producing a fluctuating electric current by fluctuations of light.

While selenium cells have been used for many different purposes, for instance, such as turning on and off the light on buoys, our exultation is too previous if we expect to use it to transmit pictures. Selenium has two fundamental defects: its resistance variations are not directly proportional to the variations in illumination and these variations do not follow instantaneously changes in illumination. The pictures transmitted by it would be blurred and the process of transmission would be entirely too slow for practical use. To be practical the change in electric current must be instantaneous and directly proportional to the intensity of light to which it is due. Such a device is the photo-electric cell.

A photo-electric cell used in measuring the relative luminosity of stars at the University of Wisconsin by Professor Joel Stebbins is shown in Fig. 1. These cells vary greatly in form but the principle of operation is common to all. This principle is the liberation of electrons by impinging light. This is akin to the liberation of electrons by heat from the filament of the electron or vacuum tube.

There are many substances from which electrons can be set free by the action of ether radiations, but most photo-electric substances do not exhibit any sensitivity to radiations below those of ultra violet light. Salts of the alkali metals, such as potassium and sodium, show photo-electric sensitivity when subjected to radiations within

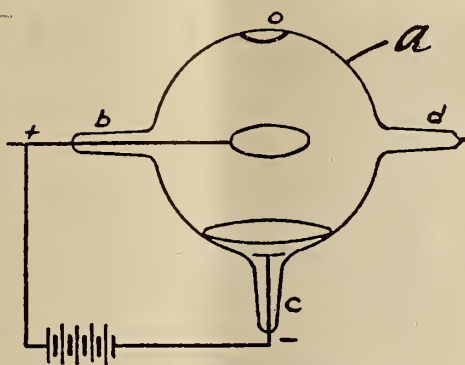


Fig. 2—Diagram of a Photoelectric Cell

the visible solar spectrum, and consequently the active material of photo-electric cells is commonly made of these salts.

Action of the Cell

A cell using potassium hydride for the active substance is perhaps the most satisfactory as it exhibits no time lag, and the intensity of the resulting electron stream—electric current—is directly proportional to the intensity of the impinging light.

The principle of operation will be readily understood from Fig. 2, which is a line drawing of the essential features of the cell of Fig. 1. The essential parts are a quartz or glass bulb (a), about two inches in diameter with two projecting terminals (b) and (c), and the stem (d), through which the bulb is exhausted.

The inner surface of the bulb is all coated over with a thin layer of silver, except the window, O, through which light enters. This silver lining is connected to the terminal (c). Upon this lining of silver is deposited a thin coat of potassium hydride—photo-electric substance. The silver lining thus serves as both as a base and a conducting material for the light-sensitive material deposited upon it. The electrode (b), which consists of a platinum wire extending into the center of the bulb where it is bent into a ring. This ring constitutes the anode of the cell, and the terminal (c), which is in contact with the silver coating is the cathode. The anode is the terminal by which the current enters and the cathode is the terminal by which it leaves the cell.

When light enters the cell through the window, O, it liberates electrons from the photo-electric substance, and the difference of potential between (b) and (c) causes these electrons to pass out at the plus terminal (b) and re-enter at the negative terminal (c). The reader will remember that the electron stream moves in a direction just the opposite to the conventional designation of current flow.

Light Intensity Variations

So long as the difference of potential between (b) and (c) remains constant, and so long as the intensity of light entering at (O) is constant, the electron stream which constitutes the electric current remains constant. Any slight variations in the intensity of light entering the window (O) will be immediately followed by a change in the intensity or strength of the electric current. If then a beam of light

of constant intensity be projected into the window (O) and an ordinary lantern slide be moved across the window, it is obvious that the intensity of light transmitted by the lantern slide will vary with the light and dark portions of the picture on the slide just as it does when the picture is projected on the screen. The electric current in the external circuit (b-c) will thus fluctuate with the fluctuations of the light as the slide is moved through the beam. This current will be slight but by connecting the circuit b-c into the grid circuit of a vacuum tube the current may be amplified to any desired value within reason. This amplified current may then be used to modulate the high frequency carrier current described in the first part of this article.

Summary

To make the principles as clear and simple as possible, let us briefly recapitulate them.

First there must be produced in the ether or space a high frequency energy wave. This wave carries the energy from the sending station to the listening station just as the 24-volt battery in a telephone central supplies the energy for the operation of the subscriber's telephone. The next step in television is the modulation of this carrier current by another current which is made to fluctuate with the fluctuating intensity of light as it is either transmitted by or reflected from the picture or object whose likeness is to be transmitted. This modulation is accomplished by moving the picture through a beam of light which enters a photo-electric cell. The fluctuations of light intensity produce variations in electric current intensity, and then by means of vacuum tubes the fluctuating current is amplified, and finally the amplified current modulates the carrier current.

Very simple it seems, but before we transmit any pictures by radio several other things are needed. These will be explained in detail in the future.

The Arcade Returns

Not all of the entertainment offered in the Broadway district is of the high-priced variety. The Coney Island type is to be found as well—shooting galleries, a flea circus, penny arcades and, for refreshment, hot dogs and orangeade. Now a new attraction is promised—arcade theatres with five-cent slot movies.

The inventor says that it will provide color, sound and motion. General news and sport events will be shown, and perhaps, later, short feature pictures. They will come in consecutive instalments, and the visitor will move from one machine to the next as he finishes a section. Five cents for five minutes will be the tariff.

Clerks who, at the lunch hour, dash out for a sandwich and a cup of coffee and then off to a movie, will be spared the pangs of returning to the office at the most exciting moment in the picture. They will be able to take two short reels today, two or three tomorrow, and so on to the end of the picture.



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Correspondence

ADDITIONAL expressions of approval and disapproval continue to come in on the article "The Future of Projection" by Gerald W. Link which appeared in the June issue. One of the most interesting of these comments is the following letter from G. W. Bennewitz of the Egyptian Theatre at Sioux Falls, South Dakota. His letter, in part, follows:

... Friend Link sets forth his views very well but falls down sadly on correct nomenclature. He stresses the fact that equipment manufacturers have shown very little improvement in their product from year to year. I feel that to some extent this is true; but if one were to examine closely the projection rooms of the larger theatres, he would find many special attachments which are special equipment, and which is due to the fact that manufacturers have in the past found it necessary to make their equipment as near foolproof as possible.

Who Is at Fault?

The projectionist is to blame to some extent for the lack of improvements. It has only been within the last few years that projectionists in general have made any great effort to improve their knowledge of projection and its problems. It is, therefore, only natural that manufacturers have been slow in improving their product, as any improvement, listed as regular equipment, must necessarily come under the care of incompetent as well as competent projectionists.

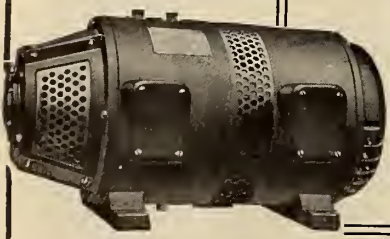
Objects to "Booth"

Friend Link uses the word "booth" twelve times in his article. This is a word we have been trying to bury for many years. ... It would require an agile imagination to classify the projection rooms of today as "booths." Further on in his article he uses the term "better booth angles" which means absolutely nothing so far as the projection of motion pictures is concerned. If he had said "projection angle" he would have been quite right. I should like to ask if it is good policy for trade papers to continually display incorrect nomenclature before the younger members of the craft? My reply is "Positively not!" ... I shall close with the sincere hope that all trade papers will see fit to make the necessary corrections in nomenclature before publishing their articles.

Mr. Bennewitz is perfectly justified in his complaint on incorrect nomenclature. Efforts to suppress the word "booth" as descriptive of a projection room have been constant on the part of the forward-looking members of the craft. Undeniably the word "booth" is suggestive of a pent-house or a coop, and the free use of the word tends to promote an erroneous impression on people outside of the craft as to the function of the projectionist.

We cheerfully concur with Mr. Bennewitz in his attitude on this point; but we doubt exceedingly that the term "booth" will give way to "projection room" with-

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—THEN
FORGET IT"**



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Questions & Answers

LAST month's Question Box prompted a group of answers which were of such uniform high order that the task of selecting the best of the lot was very difficult.

The choice for the best answers finally simmered down to those of Claude McAdams, Local 469, Amarillo, Texas, and R. J. Sherman of the Princess Theatre, Aberdeen, South Dakota. H. J. Leary of New York City eased into the runner-up position by a slim margin over P. U. Nakashian of San Francisco.

Messrs. McAdams and Sherman may be considered old hands in the matter of successful competition in a Question and Answer Contest. Both of these gentlemen have competently answered every group of questions used in the Question Box. Mr. Sherman illustrated the various points stressed in his answers with some very fine diagrams, and it is to be regretted that reproduction of them is precluded by the drawing medium used and their position on the sheet.

The Question Box evidently is serving its purpose admirably, if one might judge by the number and quality of answers received. It is to be supposed that many men, although answering the questions to their own satisfaction, fail to set down and send in their replies. This is perfectly satisfactory, viewed from any angle; but competition, and lots of it, is needed to prevent Messrs. McAdams and Sherman from walking away with each successive sweepstakes.

Sound for Conn. Circuit

Hoffman Brothers, who control ten theatres in Connecticut, have signed for Vitaphone installations for all their houses, with service scheduled to begin about October 1st.

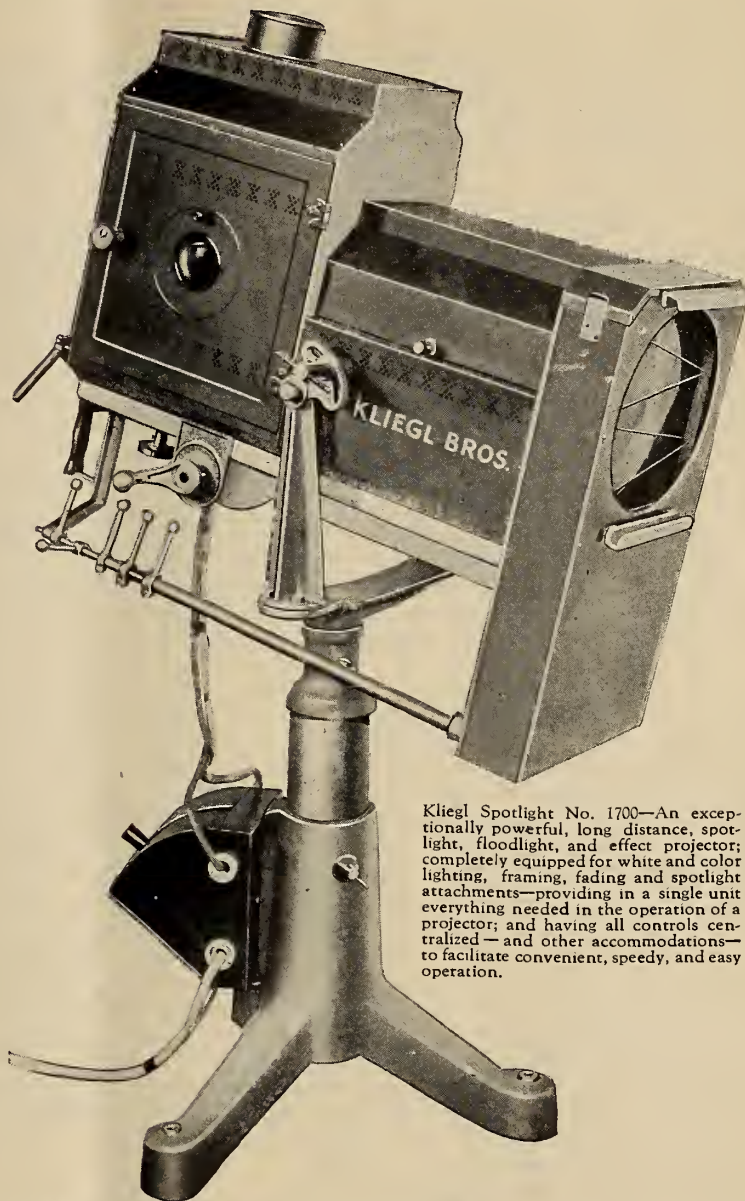
The ten Hoffman houses are: Capitol and the Strand, New Britain; Princess and the Strand, Hartford; Palace, Torrington; State, So. Manchester; Gem, Willimantic; Capitol, Ansonia, and the New and the Strand, Waterbury.

With Fox having gained control of the Poli houses, Connecticut is well advanced in sound installations.

out the stiffest sort of a struggle. Members of the craft certainly should not use the word "booth," yet for more than a year now we have failed to notice any particular striving on the part of projectionists to avoid using the term.

Aye or Nay?

Mr. Bennewitz's intimation in the fore part of his letter that projectionists themselves are responsible to some extent for the slow progress made in improved projection equipment, while giving impetus to a flow of thoughts on our part, is much too rich in promising reply material to have its edge taken off by comment on our part. We hereby tender the subject matter to the craft for their earnest consideration, and if it fails to provoke at least 25 tepid replies, we shall be sorely disappointed in our estimation of the spirit of the craft.



Kliegl Spotlight No. 1700—An exceptionally powerful, long distance, spotlight, floodlight, and effect projector; completely equipped for white and color lighting, framing, fading and spotlight attachments—providing in a single unit everything needed in the operation of a projector; and having all controls centralized—and other accommodations—to facilitate convenient, speedy, and easy operation.

A Remarkable Spotlight

of greatly improved design—more convenient controls, greater flexibility of operation, and higher lighting efficiency—with an entirely new principle of spot-flood control, wherein the arc lamp remains fixed in position and the lens travels for focusing the light beam. A 125 ampere, long distance projector; complete in every respect; providing in a single unit everything required; spot-; flood-; and color-lighting; framing shutters; effects; etc.; compact design; sturdily constructed—nothing fragile or complicated to break or become inoperative; hood, lower in front—so that operators' line of vision is unobstructed; projects any distance up to 150 ft.; gives anything required from a 4 ft. spot to a 50 ft. flood—and all colors desired. Truly a remarkable spotlight. Examine it at our plant—or write for full details. Nothing like it has ever been available heretofore. It is far superior to any long-range spotlight now used in the theatre. We are enthusiastic about it—and you will be too—when you see it.

KLIEGL BROS

UNIVERSAL ELECTRIC STAGE LIGHTING CO., INC.

321 WEST 50th STREET
NEW YORK, N.Y.

As *The* EDITOR Sees IT

¶ *Girding for the Tussle*

THE significance of sound pictures as a factor in the motion picture industry is just being realized. Unfortunately, thus far it has been a disturbing factor. Its benefits have not yet been universally distributed. One cannot blame the sound picture people for feeling their way along cautiously. They already have too much at stake, too much invested, and great expectations for the future—and so they are proceeding slowly, learning by costly mistakes but building unmistakably. To some extent they have permitted themselves to become unduly enthusiastic, and as a result made some rash promises publicly. Right now they are refraining from any statement which will place them in a false position. But in a few months they will be going full-blast with installations, advertising, publicity and general ballyhoo.

¶ *Interchangeability*

THE great problem is "Interchangeability." As was pointed out in our July editorial, this has been the biggest stumbling block. Exhibitors were afraid to buy one kind of sound equipment and then discover that the pictures they wanted were recorded with another make of sound device and hence could not be shown in their theatres unless it was run as a silent film as of old. Naturally, when the sound people were faced with this problem they set about to remedy it. All this necessitated conferences, bickering, and a general about-face in factory plans and sales policies—all of which caused a sudden but temporary slump. Western Electric seems to be leading the field, however. Aided by extremely intelligent publicity it really stole a march on all its competitors. With Vitaphone and Movietone tucked snugly under its protecting wing, it began to sell and to install before any of its competitors were ready. Then when the others were ready—that is, RCA, among others—it raised the question of interchangeability, claiming that both its devices—Vitaphone and Movietone—adapted themselves automatically to other companies' sound film and disk systems. That put RCA with its Photophone on the defensive, and it finally had to submit and change its recording and projecting processes so that it would interchange with those of Western Electric. That does not, however, end the question of interchangeability. What about the fourteen other sound devices that have been announced as marketable? How and when will they adjust the problem of interchange? We can't answer this; but these various companies will have to answer it before

they win the confidence of the exhibitor. Western Electric announces they will have 3,000 installations of Vitaphone and Movietone within eighteen months. Add to this the Photophone installations and those of other devices, and the period will see at least one-third of all theatres in this country equipped with sound picture apparatus.

¶ *All One Family*

HOWEVER, the outsider can't be blamed when he asks what all the shootin' is fer. Why does RCA offer such strenuous opposition to Western Electric? General Electric and the American Telephone & Telegraph Co. are tied closely together, the leaders of one being the leaders of the other. Now, G. E. owns RCA; the A. T. & T. owns W. E. Figure it out for yourself. Can it be that these blood brothers are putting up a mock battle for the mystification of the public? In the meantime not only exhibitors but producers and distributors are perplexed as to which way to turn. Every big producing company has made or is making a tie-up with a sound picture service, and the studios on the coast are being almost completely refitted. Directors are adjusting themselves to the new element, and stars are industriously taking vocal lessons. Many of the latter will not qualify—which means many new faces in the next twelve months. The smallest independent producer is talking sound pictures and now they are even

The greatest factor in the success of sound pictures has been the Projectionist. Without him this new force would have died a-borning. His high intelligence, his skill, his pride in his work, his easy familiarity with all the complex details of modern day projection found him splendidly prepared to cope and master the intricate phases of sound projection.

Let the producers and distributors of sound pictures congratulate themselves at finding themselves face to face with our great craft. Let them appreciate it!

Boone Manneall

planning sound pictures for animated cartoons.

¶ *A Tangled Trail*

AND here is another pretty mix-up directly traceable to sound. As is well-known, Joseph P. Kennedy, the Boston banker who turned F. B. O. from failure to success, finally formed a combination that included the Keith and Orpheum theatre circuits and Pathe and P. D. C. Finally it seemed that First National, led by Kennedy, was also to join this group—all to be supplied with the RCA Photophone. Then David Sarnoff, who heads the Radio Corporation, and Kennedy disagreed and split, and the deal for Photophone for the combination is off. Then Kennedy dropped away from First National, which apparently is to continue with RCA on its own. Thus far, all these things have occurred—and the future will see the problem adjusted. But the fact is that sound pictures have stirred the never complacent waters of the industry into a white fury and they will cause many new alignments and adjustments before the waters settle.

Fundamental Optics*

By L. C. PORTER and G. F. PRIDEAUX

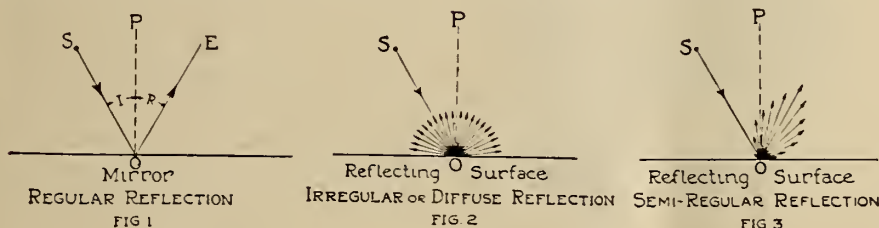
PERHAPS it will be worth while to consider briefly some of the fundamental optics involved in projection work.

Having the light available, we now have to collect as much of it as is practical and direct it to points where it will be most useful. There are two methods of directing light. One is by reflection, and the other by refraction. Refraction is of two general types—that is, specular and diffuse.

When a ray of light strikes a highly polished surface it is reflected as a ray at an angle with a normal to the reflecting surface which is equal to the angle be-

tween the incident ray and the normal. The most common form of mirror is the ordinary flat mirror or "looking glass." Such a mirror is of little or no value in projection work. If, however, the mirror is made as a section of a sphere it may be of great value. This is because incandescent lamps give off their light practically equally in all directions.

The condenser of a projector will pick up the light emanating toward it, but by itself will not utilize the light emitted to the rear. If a spherical mirror is placed behind the source it will intercept this backward light and reflect it back into the source itself, filling up the spaces between different filament coils and the turns of individual coils, thus creating in effect a solid light source. (Fig. 4.)



tween the normal and the incident ray. Figure 1 illustrates this condition.

The other form of reflection is known as diffuse reflection. This occurs when a ray of light strikes an unpolished or rough diffusing surface and is broken up into many separate rays, reflected in all directions. (Fig. 2.)

Many Variations

There are, of course, many variations between these two extremes. Partially diffuse reflection is used in scientifically prepared motion picture screens so as to cause the picture to appear of maximum brilliancy in the directions from which the audience views it. (Fig. 3.)

Specular reflection is utilized in connection with the spherical mirrors used in the back of the lamps of motion picture projectors and stereopticons.

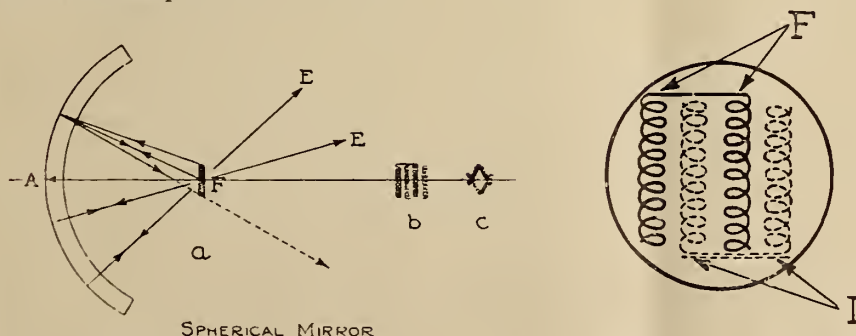
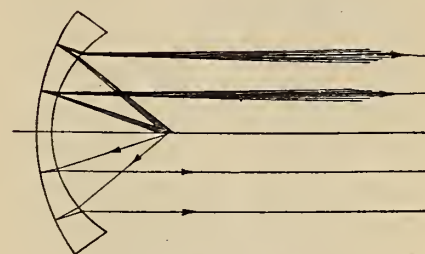


Fig. 4. By means of the spherical mirror, the image of the filament is reflected between the coils of the actual filament, giving the effect of a nearly solid light source. This is shown in *b* at the left, and at the right is an enlarged view of this effect, *F* being the filament and *I* the inverted image.

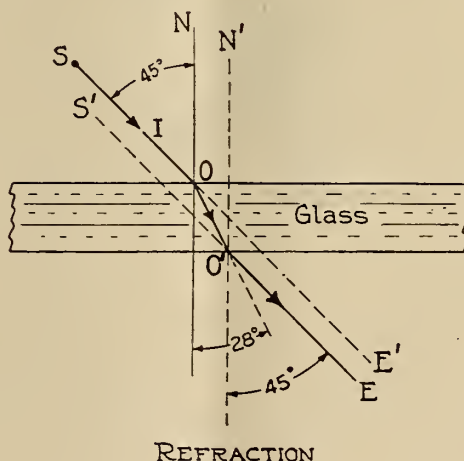


MANGIN MIRROR
FIG. 5

When adjusted correctly, spherical mirrors increase the screen illumination of stereopticon and motion picture projectors as much as 40 per cent.

Mangin Mirrors

The most common form of the parabolic mirror is the highly polished metal reflector of the common automobile headlight. Other forms are the big glass mirrors that are ground and polished to a very great accuracy for use in high-power searchlights. These mirrors deviate some-



REFRACTION

FIG. 6. By refraction is meant the change of direction of a light ray in passing from one transparent medium to another of different density. With the kind of glass shown, a ray entering at an angle of 45 deg. to the normal is bent downward to an angle of 28 deg. with the normal.

what from the true parabola so as to compensate for the refraction of the light as it passes twice through the glass, and are called Mangin mirrors. (Fig. 5.)

The control of light by means of refraction is accomplished by passing the light from a medium of one density through a medium of another density. (Fig. 6.) This method of control is used with the condenser and objective lenses used in motion picture projectors and stereopticons.

Stereopticons

The general principles of what is today known as visual instruction were laid down by Comenius more than 300 years ago in his "Orbis Pictus." A century later Pestalozzi advanced beyond the picture stage by insisting that teachers must either

(Continued on page 32)

*Edison Lamp Works Bulletin.

Kliegl's New Spotlight

By ANDREW J. MCGREGOR

A NEW spotlight, floodlight, and effect projector of greatly improved design—with more convenient controls, greater flexibility of operation, and higher lighting efficiency and embodying an entirely new departure in spot-flood control, wherein the arc lamp remains stationary and the lens is made to travel for focusing the light beam—has recently been announced by Kliegl Bros.

It is a 125 ampere, long-distance projector, complete in every respect, providing in a single unit everything required of a projector—spot-, flood- and color-lighting, framing shutters, effects, etc.

The design is compact, can be accommodated in a comparatively small space, and the hood is lower at the front than at the rear so that the projectionist's line of vision is unobstructed.

Higher Lighting Efficiency

It projects the light any distance up to 150 feet—and gives anything required from a 4-foot perfectly round spot to a 50-foot spread—with uniform intensity, providing an intense white light having all the qualities of strong sunlight, bringing out brilliant colors in their true value. Finer adjustments of the arc afford a greater amount of light projection for a given current consumption, and a shield in front of the arc prevents light from the flame entering the optical system—eliminating ghosts and false light.

Centralized Control

All controls, including arc, focusing, shutters, color screens, and directional controls, are centralized at the rear of the spotlight, in full view of the projectionist, and within arms' length of the operating position—affording the greatest convenience, speed and ease of operation.

Arc Lamp Stationary

The arc lamp remains in a fixed position—all focusing is done by moving the lens, causing no disturbance in the adjustment of the arc. Arc control handles are fixed in position and do not protrude more than a few inches beyond the lamp housing.

Arc carbons may be adjusted in every conceivable way—angularly, vertically, and horizontally—and the lower carbon holder may be moved independently of the upper carbon, in any lateral direction. Six different controls are provided so that the arc can be quickly and easily centered, irrespective of any condition that may arise, and the arc length and crater adjusted to obtain the maximum effective light. Fibre grips insulate the arc control handles from the heat of the arc and protect the projectionist against burnt fingers.

Focusing Control

Condenser lens travels on a movable carriage and focuses the light without disturbing the arc lamp. The lens is made

to move by simply turning a handle on the side of the spotlight. It travels quickly, smoothly and freely—stays put in any set position without being clamped, and is always ready for instantaneous change of focus.

One lens takes care of the full range from a 4-foot spot to a 50-foot flood. The simple movement of the lens, backward or forward, along the optical axis by means of the control handle, is all that is re-



New Kliegl Spot

quired. A pointer on the focusing control handle travels over a numbered dial on either side of the spotlight and in plain view of the operator. It indicates the position of the lens and permits setting the lens quickly to any desired focus.

The lens carriage slides on two parallel rods, and is attached to a chain, which passes over two sprocket wheels—one at the front and the other at the rear. The shaft of the rear sprocket extends outside the housing and to it is attached the control handle.

To the underside of the chain a counterweight is attached which also slides on two parallel rods, but always moves in a direction opposite to that of the lens and thereby maintains the center of gravity and keeps the spotlight in perfect balance at all times.

The frame in which the lens is mounted is hinged so that the lens can easily be removed for cleaning or replacement, and is also so designed as to allow unrestricted expansion.

Color Lighting

A color box or boomerang on the front of the spotlight provides means for changing the color of the light beam. It contains four color frames for gelatin

mediums, controlled by levers at the rear of the spotlight—and ready for operation at all times. There is a separate lever for each color frame and each lever is keyed to correspond with the color it controls. The position of the handle indicates the position of the color screen and a quarter turn throws the screen in or out of position.

The color screen is free of all mechanical connections and may be readily removed by simply raising the cover of the color box and lifting the screen out of its slide grooves; or, if it is to be inserted, simply dropping it into its proper place. Gradual or quick changes of color can be produced and one color blended with another as may be desired.

Framing and Fading

A curtain shutter and iris shutter set in the lamp housing, and independently controlled from the rear, permit light to be framed to flood the stage or orchestra pit, and to fade the light on or off at will. They are quick acting in operation and a quarter turn of the handle is sufficient to operate the shutters from full-opening to black-out, or vice versa. Guide marks on the back of the housing indicate the position of the shutters and facilitate speedy operation.

All parts and adjustments are easy of access—large self-closing spring doors, on either side of the lamp housing, permit access to the arc lamp for changing carbons and making adjustments. A hinged cover over the lens compartment gives free and easy access to the lens for cleaning or replacing. A hinged cover over the color box permits access to color frames, and all external adjustments, clamp screws, etc., are within easy reach.

Perfectly Balanced

The spotlight is perfectly balanced in every way—it moves freely and easily in any direction and remains set in any position. It "follows" with remarkable ease. A well designed base and heavy pedestal upright provide a rigid and substantial support for the spotlight, prevent vibration and insure steadiness in the operation. The weight of the spotlight rests on ball bearings and in effect all friction between heavy moving parts is eliminated. Practically no effort is required on the part of the operator directing the light beam.

The spotlight can be set to any desired angle within practical requirements—quickly and easily fixed in position by the turn of a hand screw. It swings through a vertical angle of 67°–45° below the horizontal and 22° above, and turns completely around in the horizontal plane about its central axis. The base is telescopic and permits adjustments in height. The customary slide grooves are provided on the front of the color box and permit the use of all standard effects, color wheels, extra color frames, and special spotlight apparatus.

The New Vallen Syncontrol

THE combination of sound and scene is, of necessity, being considered by every exhibitor. Naturally, the devices upon which perfect presentation depend must change to meet the demands of synchronized pictures or become obsolete.

The new order in pictures, the so-called Voice of the Movies, brings their presentation very near to the legitimate. Legitimate presentation has for centuries looked to the curtain for creation of proper atmosphere. Thus, with the advent of "talkies" the necessity for noiseless, quick and positive curtain control becomes even more imperative.

The distance from screen to booth is often such that the projectionist, with his many responsibilities, sometimes finds it difficult to correctly judge or remember the position of curtains on the stage. This is especially true where curtain movements are as frequent and varied as the presentation of synchronized pictures demands. The Vallen Syncontrol, however, eliminates all possibility of hitch from this source.

Accurate Remote Control

The Syncontrol is exactly timed to per-

mit easy and perfect synchronization of sound, scene, and curtains. Further, the projectionist, by means of red and green indicators, knows the exact movement or position of the curtains on the stage. These indicators function automatically and change the instant the button is pressed: that is, when one presses the button to start, stop, or reverse the curtains, the indicators automatically operated in their respective relation to the position of the curtains.

The construction of the Syncontrol is very simple; the wiring, inexpensive, consists solely of four wires from Syncontrol, located on stage, to control station in the projection room. As many control stations as desired may be placed in the circuit, permitting instant starting, stopping, or reversing of curtains by pressing one button.

Mr. Vallen developed the Syncontrol entirely in the interest of better presentation. It enables the projectionist to introduce the little tricks of magic obtainable through varied curtain movements,—the employment of curtains to enhance introduction, sequence, fade-out.

Ten Florida Locals Meet in Orlando

REPRESENTATIVES from ten local Unions in Florida gathered in Orlando recently for their first get-together and business meeting. W. P. Raoul, district representative for the International Alliance, was chairman of the meeting, and R. H. Johnson of West Palm Beach acted as secretary.

Dinner at the Latch String Tea Room ushered in the first day of the meeting, and a program of entertainment was given under the direction of the Entertainment Committee comprised of three members of Orlando Local 631 as follows: E. G. Barnett, F. B. Carpenter and D. S. Nicholson. The Orlando Local acted as host for the meeting and their efforts met with the appreciative praise of all the visitors.

That Florida Climate

Between business sessions the delegates took sightseeing trips around Orlando and its environs, and Mr. Barnett may be pardoned for the statement that everyone thought it a beautiful and progressive city.

Among the visitors to the meeting: W. E. Sullivan, Tampa; B. A. Bonnett, Bradenton; John Spearling, Jacksonville; George Raywood, Miami; R. E. Huss, St. Petersburg; Oscar Gray, Daytona Beach; R. H. Johnson, West Palm Beach; J. B. McGee, Orlando; J. B. Conter, Lakeland, A. L. Cash, Fort Lauderdale; Eddie Roberts, Miami; Ross Cochran, Jacksonville; and J. B. Fettee and C. H. Austin, of Tampa.

Canadian Theatre Supply Compiles Fine Record

The Canadian Theatre & Electric Supplies, Ltd., is the leading supply house in Canada and has equipped some of the best

and largest theatres from coast to coast. This firm has a complete service plant designed to equip any theatre from the marquee to the screen.

The mechanical department is under the supervision of Charles Dentebeck, who is also President of Toronto Local 173.

Mr. Dentebeck is also Chief Projectionist for the Famous Players Canadian Corp. and is responsible for the high standard of projection in the theatres under his direction.

Service and satisfaction is the slogan of this firm, and it seems to have been closely adhered to.

Canada's Reliable Supply House

We specialize in projection equipment and carry only standard lines.

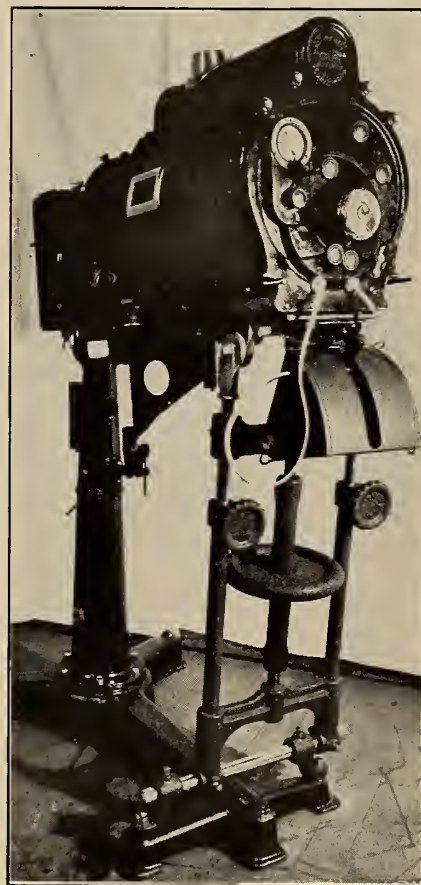
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MESTRUM'S combination lamphouse carriage and pedestal brace for Simplex projectors insures perfect rigidity and eliminates all vibration. Can be used with old-style, 3-point base or with new-style, 5-point base. Installed quickly without machine work.

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The Leading Journal of the British Cinematograph Industry

20th Year of Weekly Publication

Contains a complete section each week for the special benefit of Projectionists.

Cash prizes awarded for original ideas published. Specimen copies 18 cents.

Annual Subscription 2 dollars 50

THE BIOSCOPE PUBLISHING CO., Ltd.
8-10 Charing Cross Road, London, W. C. Eng.

Thide to Offer a New Changeover Device

With the introduction of the "Automatic Shutter Control" as a changeover and light-control device comes the further announcement that Charles S. Thide, its inventor, is about to introduce a foot-switch, especially designed and patented, enabling the simplest installation and assuring the greatest efficiency and dependability in making a changeover.

The demands of better projection clearly

demonstrate the need for the best changeover devices possible, and the degree of efficiency in the changeover operation depends upon both the electrical and mechanical construction of the foot-switch.

Perfect Timing

Mr. Thide's switch embodies the best in motion picture mechanics and is so designed as to eliminate any possible lag in current application, thereby insuring perfect timing of the action of the changeover itself, without regard to how slow the projectionist may press on the foot-switch plunger. A

period of darkness lasting for only an instant is readily discernible on the screen.

It simplifies wiring installation in that there are only three wires between the projectors, regardless of the number of projectors used, and enables uniform installation for any number of projectors and all uses. Neither soldering nor splice boxes are required.

There is a rapid-break contact involved in the power leads which prevents arcing, tending to prolong the life of the switch. Such a switch is very desirable in connection with sound picture equipment.

TABLE GIVING SCREEN IMAGE OF PICTURE AT THROW OF—

| Equivalent Focus in Inches | 15' | 20' | 25' | 30' | 35' | 40' | 45' | 50' | 55' | 60' | 65' | 70' | 75' | 80' | 85' | 90' | 95' | 100' | 105' | 110' | 115' | 120' | 125' | 130' | 135' | 140' | 145' | 150' |
|-------------------------------|------------|------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
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| 2 1/8 | 4.8 6.4 | 6.4 8.5 | 8.0 10.7 | 9.6 12.8 | 11.2 15.0 | 12.8 17.1 | 14.4 19.2 | 15.8 21.1 | 17.6 23.5 | 19.2 25.6 | 20.8 27.7 | 22.4 29.9 | 24.0 32.0 | 25.8 34.2 | 27.3 36.3 | 29.0 38.6 | 30.4 40.5 | 32.0 42.6 | 33.8 44.9 | 35.2 46.9 | 36.8 49.1 | | | | | | | |
| 2 1/4 | 4.5 6.0 | 6.0 8.0 | 7.6 10.1 | 9.1 12.1 | 10.5 14.1 | 12.1 16.2 | 13.6 18.2 | 15.0 20.0 | 16.7 22.3 | 18.2 24.2 | 19.6 26.1 | 21.3 28.1 | 22.7 30.2 | 24.2 32.2 | 25.8 34.4 | 27.2 36.3 | 28.6 38.2 | 30.2 40.3 | 31.9 42.5 | 33.4 44.4 | 34.8 46.4 | 36.3 48.3 | 37.8 50.4 | | | | | |
| 2 1/2 | 4.0 5.4 | 5.4 7.2 | 6.9 9.2 | 8.2 10.9 | 9.5 12.7 | 10.9 14.6 | 12.3 16.4 | 13.4 17.9 | 15.0 20.0 | 16.4 21.7 | 17.7 23.6 | 19.0 25.4 | 20.4 27.2 | 21.6 28.9 | 23.2 30.8 | 24.6 32.7 | 25.9 34.4 | 27.2 36.2 | 28.6 38.2 | 29.7 39.8 | 31.2 41.6 | 32.6 43.4 | 34.1 45.3 | 35.4 47.1 | 36.9 49.1 | 38.0 50.6 | | |
| 2 3/4 | 3.7 4.9 | 4.9 6.6 | 6.2 8.3 | 7.4 9.9 | 8.7 11.6 | 9.9 13.2 | 11.1 14.9 | 12.2 16.3 | 13.6 18.2 | 14.8 19.8 | 16.1 21.4 | 17.3 23.1 | 18.6 24.7 | 19.6 26.3 | 21.0 28.0 | 22.3 29.7 | 23.4 31.3 | 24.7 32.9 | 26.1 34.6 | 27.2 36.3 | 28.4 37.9 | 29.6 41.2 | 31.0 42.8 | 32.1 44.4 | 33.2 46.3 | 34.6 47.7 | 35.8 49.4 | 37.1 49.4 |
| 3 | 3.4 4.5 | 4.5 6.0 | 5.7 7.6 | 6.8 9.1 | 7.9 10.5 | 9.1 12.1 | 10.2 13.6 | 11.2 14.9 | 12.4 16.6 | 13.6 18.1 | 14.7 19.6 | 15.9 21.1 | 17.1 22.7 | 18.2 24.2 | 19.3 25.7 | 20.4 27.3 | 21.5 28.7 | 22.7 30.2 | 23.8 31.8 | 24.9 33.2 | 26.1 34.7 | 27.2 36.2 | 28.3 37.7 | 29.4 39.2 | 30.5 40.7 | 31.7 42.3 | 32.8 43.7 | 34.0 45.3 |
| 3 1/4 | 3.2 4.2 | 4.2 5.6 | 5.3 7.1 | 6.3 8.4 | 7.3 9.8 | 8.4 11.2 | 9.4 12.6 | 10.4 13.8 | 11.5 15.4 | 12.6 16.7 | 13.6 18.1 | 14.6 19.9 | 15.7 20.9 | 16.6 22.3 | 17.8 25.1 | 18.8 26.5 | 19.9 27.8 | 20.9 29.2 | 22.0 30.6 | 22.9 32.1 | 24.1 33.4 | 25.1 34.9 | 26.3 36.3 | 27.3 37.6 | 28.3 39.1 | 29.3 40.4 | 30.4 41.8 | 31.3 44.8 |
| 3 1/2 | 2.9 3.9 | 3.9 5.2 | 4.9 6.6 | 5.9 7.8 | 6.8 9.1 | 7.8 10.4 | 8.7 11.6 | 9.6 12.8 | 10.7 14.2 | 11.6 15.5 | 12.6 16.8 | 13.6 18.1 | 14.5 19.4 | 15.4 20.6 | 16.5 22.0 | 17.4 23.3 | 18.4 24.6 | 19.4 25.8 | 20.4 27.2 | 21.4 28.4 | 22.3 29.8 | 23.3 31.0 | 24.3 32.3 | 25.3 33.6 | 26.3 35.0 | 27.2 36.2 | 28.2 37.5 | 29.1 38.8 |
| 3 3/4 | 2.7 3.6 | 3.6 4.8 | 4.6 6.1 | 5.2 7.4 | 6.4 8.5 | 7.3 9.7 | 8.2 10.9 | 8.9 11.9 | 10.0 13.3 | 10.9 14.5 | 11.8 15.7 | 12.7 16.9 | 13.6 18.1 | 14.6 20.6 | 15.5 21.1 | 16.4 22.1 | 17.1 24.1 | 18.1 25.8 | 18.9 26.7 | 20.0 27.8 | 20.9 29.0 | 21.7 30.4 | 22.7 32.0 | 23.4 34.3 | 24.5 32.6 | 25.4 33.8 | 26.4 35.0 | 27.2 36.2 |
| 4 | 2.5 3.4 | 3.4 4.5 | 4.4 5.8 | 5.1 6.8 | 5.9 7.9 | 6.8 9.1 | 7.6 10.2 | 8.4 11.2 | 9.4 12.5 | 10.2 13.6 | 11.1 14.8 | 11.9 15.9 | 12.8 17.0 | 13.6 18.2 | 14.5 19.3 | 15.3 20.4 | 16.1 21.5 | 17.1 22.7 | 17.9 23.8 | 18.8 24.9 | 19.6 26.1 | 20.4 27.2 | 21.2 28.3 | 22.1 29.5 | 23.0 30.6 | 23.8 31.8 | 24.6 32.8 | 25.5 34.0 |
| 4 1/4 | 2.4 3.2 | 3.2 4.2 | 4.0 5.4 | 4.8 6.4 | 5.6 7.5 | 6.4 8.5 | 7.2 9.6 | 7.9 10.7 | 8.8 11.8 | 9.6 12.8 | 10.4 13.9 | 11.2 14.9 | 12.0 16.0 | 12.8 17.1 | 13.7 18.2 | 14.4 19.2 | 15.2 20.3 | 15.9 21.3 | 16.8 22.4 | 17.7 23.4 | 18.4 24.5 | 19.2 25.6 | 20.0 26.7 | 20.8 28.2 | 21.6 29.6 | 22.4 30.9 | 23.2 32.3 | 23.9 32.0 |
| 4 1/2 | 2.3 3.0 | 3.0 4.0 | 3.8 5.1 | 4.5 6.0 | 5.3 7.1 | 6.1 8.1 | 6.8 9.1 | 7.5 10.0 | 8.3 11.1 | 9.1 12.1 | 9.8 13.1 | 10.6 14.2 | 11.3 15.1 | 12.1 16.2 | 12.9 17.2 | 13.6 18.2 | 14.3 19.1 | 15.1 20.2 | 15.9 21.3 | 16.7 22.2 | 17.4 23.2 | 18.2 24.2 | 18.9 25.2 | 19.6 26.2 | 20.5 27.2 | 21.3 28.2 | 21.9 29.2 | 22.7 30.2 |
| 4 3/4 | 2.1 2.8 | 2.9 3.8 | 3.6 4.8 | 4.3 5.7 | 5.0 6.7 | 5.8 7.7 | 6.5 8.6 | 7.0 9.4 | 7.9 10.9 | 8.6 11.4 | 9.3 12.4 | 10.1 13.4 | 10.7 14.3 | 11.4 15.3 | 12.2 16.3 | 12.9 17.2 | 13.5 18.1 | 14.3 19.1 | 15.0 20.0 | 15.7 21.9 | 16.4 22.9 | 17.2 23.8 | 17.8 24.8 | 18.6 25.8 | 19.4 26.7 | 20.0 27.6 | 21.5 28.6 | 22.2 29.6 |
| 5 | 2.0 2.7 | 2.7 3.6 | 3.5 4.6 | 4.0 5.4 | 4.8 6.4 | 5.5 7.3 | 6.2 8.2 | 6.8 9.0 | 7.5 10.0 | 8.2 10.9 | 8.8 11.8 | 9.6 12.7 | 10.3 13.6 | 10.9 14.5 | 11.5 15.4 | 12.3 16.4 | 12.9 17.2 | 13.5 18.1 | 14.3 19.1 | 14.9 19.9 | 15.7 20.8 | 16.4 21.8 | 17.0 22.6 | 17.7 23.6 | 18.4 24.5 | 19.0 25.4 | 19.7 26.3 | 20.4 27.2 |
| 5 1/4 | 1.9 2.6 | 2.6 3.5 | 3.3 4.4 | 3.9 5.2 | 4.6 6.1 | 5.3 7.0 | 5.9 7.8 | 6.5 8.6 | 7.1 9.5 | 7.8 10.4 | 8.5 11.3 | 9.1 12.1 | 9.7 12.9 | 10.5 13.9 | 11.1 14.7 | 11.7 15.6 | 12.3 16.4 | 13.0 17.3 | 13.6 18.1 | 14.3 19.8 | 14.9 20.8 | 15.6 21.8 | 16.2 22.5 | 16.9 23.6 | 17.5 24.5 | 18.2 25.4 | 18.7 26.3 | 19.4 27.2 |
| 5 1/2 | 1.9 2.5 | 2.5 3.3 | 3.2 4.2 | 3.7 4.9 | 4.4 5.8 | 5.0 6.7 | 5.5 7.4 | 6.2 8.2 | 6.8 9.1 | 7.4 9.9 | 8.0 10.7 | 8.7 11.6 | 9.3 12.4 | 9.9 13.2 | 10.6 14.1 | 11.1 14.8 | 11.6 15.6 | 12.4 16.5 | 13.0 17.3 | 13.6 18.2 | 14.2 18.9 | 14.8 19.8 | 15.4 20.6 | 16.1 21.4 | 16.7 22.2 | 17.3 23.1 | 18.0 23.9 | 18.5 24.7 |
| 5 3/4 | 1.8 2.4 | 2.3 3.1 | 3.0 4.0 | 3.5 4.7 | 4.1 5.5 | 4.8 6.4 | 5.3 7.1 | 5.9 7.8 | 6.5 8.7 | 7.0 9.4 | 7.7 10.2 | 8.2 11.0 | 8.9 11.8 | 9.5 12.6 | 10.1 13.4 | 10.6 14.2 | 11.2 14.9 | 11.8 15.8 | 12.4 16.5 | 13.0 17.3 | 13.6 18.1 | 14.2 18.9 | 14.8 19.6 | 15.4 20.4 | 15.9 21.2 | 16.5 22.1 | 17.2 22.8 | 17.7 23.6 |
| 6 | 1.7 2.3 | 2.3 3.0 | 2.9 3.8 | 3.4 4.5 | 4.0 5.3 | 4.6 6.1 | 5.1 6.8 | 5.6 7.5 | 6.2 8.3 | 6.8 9.1 | 7.3 9.8 | 8.0 10.6 | 8.6 11.4 | 9.1 12.1 | 9.7 12.9 | 10.2 13.6 | 10.8 14.4 | 11.4 15.2 | 11.9 15.9 | 12.5 16.7 | 13.1 17.4 | 13.7 18.2 | 14.2 18.9 | 14.8 19.7 | 15.4 20.5 | 15.9 21.2 | 16.5 21.9 | 17.0 22.7 |
| 6 1/4 | 1.6 2.2 | 2.2 2.9 | 2.8 3.7 | 3.2 4.3 | 3.8 5.1 | 4.4 5.8 | 4.9 6.5 | 5.3 7.1 | 6.0 8.0 | 6.5 8.7 | 7.0 9.4 | 7.6 10.1 | 8.2 10.9 | 8.7 11.6 | 9.2 12.3 | 9.8 13.1 | 10.3 13.7 | 10.9 14.5 | 11.5 15.3 | 11.9 16.6 | 12.4 17.4 | 13.1 18.1 | 13.6 18.1 | 14.1 18.8 | 14.6 19.5 | 15.3 20.3 | 15.7 21.7 | 16.3 21.7 |
| 6 1/2 | 1.6 2.1 | 2.1 2.8 | 2.7 3.6 | 3.2 4.2 | 3.7 4.9 | 4.2 5.6 | 4.7 6.3 | 5.2 6.9 | 5.8 7.7 | 6.3 8.4 | 6.8 9.1 | 7.4 9.8 | 7.9 10.5 | 8.4 11.2 | 8.7 11.9 | 9.5 12.6 | 9.9 13.2 | 10.3 13.9 | 11.1 14.7 | 11.6 15.4 | 12.0 16.0 | 12.5 17.4 | 13.1 18.1 | 13.6 18.1 | 14.1 18.8 | 14.6 19.5 | 15.1 20.2 | 15.7 20.9 |
| 6 3/4 | | 2.0 2.7 | 2.5 3.4 | 3.0 4.0 | 3.5 4.7 | 4.0 5.4 | 4.5 6.0 | 4.9 6.6 | 5.5 7.4 | 6.0 8.0 | 6.5 8.7 | 7.0 9.4 | 7.5 10.1 | 8.1 10.8 | 8.5 11.4 | 9.1 12.1 | 9.5 12.7 | 10.0 13.4 | 10.6 14.1 | 11.0 14.7 | 11.5 15.4 | 12.1 16.1 | 12.5 16.7 | 13.0 17.4 | 13.6 18.1 | 14.1 18.8 | 14.6 19.4 | 15.1 20.1 |
| 7 | | 1.9 2.6 | 2.5 3.3 | 2.9 3.9 | 3.4 4.5 | 3.9 5.2 | 4.4 5.8 | 4.8 6.4 | 5.3 7.4 | 5.9 8.4 | 6.3 8.4 | 6.8 9.1 | 7.3 10.3 | 7.7 11.0 | 8.2 11.6 | 8.7 12.3 | 9.2 12.9 | 9.7 13.6 | 10.2 14.2 | 10.7 14.9 | 11.2 15.6 | 11.6 16.2 | 12.2 16.8 | 12.6 17.5 | 13.1 18.1 | 13.6 18.8 | 14.1 19.4 | 14.6 20.1 |
| 7 1/4 | | | 2.4 3.2 | 2.8 3.7 | 3.3 4.4 | 3.8 5.0 | 4.2 5.6 | 4.6 6.2 | 5.2 6.9 | 5.7 7.6 | 6.1 8.1 | 6.5 8.7 | 7.0 9.4 | 7.4 9.9 | 7.9 10.6 | 8.4 11.2 | 8.9 11.8 | 9.4 12.5 | 9.8 13.1 | 10.3 14.3 | 10.7 15.0 | 11.3 15.6 | 11.7 16.2 | 12.2 16.8 | 12.6 17.6 | 13.2 18.1 | 13.6 18.7 | 14.1 18.7 |
| 7 1/2 | | | 2.3 3.1 | 2.7 3.6 | 3.2 4.2 | 3.6 4.8 | 4.0 5.4 | 4.5 6.0 | 4.9 6.6 | 5.4 7.2 | 5.9 7.9 | 6.3 8.4 | 6.8 9.0 | 7.2 10.3 | 7.7 10.9 | 8.2 11.4 | 8.6 11.4 | 9.1 12.5 | 9.6 13.3 | 10.0 13.8 | 10.4 14.5 | 10.9 15.1 | 11.3 15.7 | 11.8 16.3 | 12.3 16.9 | 12.7 17.5 | 13.1 18.1 | 13.6 19.1 |
| 7 3/4 | | | 2.3 3.0 | 2.6 3.5 | 3.1 4.1 | 3.5 4.7 | 4.0 5.3 | 4.4 5.8 | 4.8 6.4 | 5.3 7.0 | 5.7 7.6 | 6.1 8.1 | 6.6 8.8 | 7.0 9.3 | 7.4 9.9 | 7.9 10.5 | 8.3 11.1 | 8.8 11.7 | 9.2 12.3 | 9.6 12.8 | 10.0 13.4 | 10.5 14.0 | 11.0 14.6 | 11.4 15.2 | 11.9 15.8 | 12.3 16.3 | 12.7 16.9 | 13.2 17.5 |
| 8 | | | 2.2 2.9 | 2.5 3.4 | 3.0 4.0 | 3.4 4.5 | 3.8 5.1 | 4.2 5.6 | 4.6 6.2 | 5.1 6.8 | 5.5 7.4 | 5.9 7.9 | 6.4 8.5 | 6.8 9.1 | 7.2 10.1 | 7.6 10.8 | 8.1 11.3 | 8.5 11.9 | 8.9 12.5 | 9.4 13.0 | 9.8 13.6 | 10.2 14.2 | 10.6 14.6 | 11.0 15.2 | 11.5 15.8 | 11.9 16.3 | 12.3 17.3 | 12.7 17.7 |
| 8 1/2 | | | | 2.4 3.2 | 2.8 3.7 | 3.2 4.3 | 3.6 4.8 | 4.0 5.3 | 4.4 5.7 | 4.8 6.4 | 5.2 6.9 | 5.6 7.5 | 6.0 8.0 | 6.4 8.5 | 6.8 9.1 | 7.2 10.1 | 7.6 10.7 | 8.1 11.2 | 8.4 11.7 | 8.8 12.2 | 9.2 12.8 | 9.6 13.3 | | | | | | |

Where to Buy Good Equipment

Notice to Projectionists

The Motion Picture Projectionist recommends all Dealers represented in this section. We urge you to support them at all times. Patronize them for new or used equipment of every description. If they haven't got what you want they'll get it for you.

These Dealers, by the fact of their being on this page, show that they value your friendship and your good-will. They appreciate your importance as a buying power. Instead of ignoring your existence or trying to reach you inexpensively by reaching your theatre manager, they are advertising direct to you. Let this show of good-will be mutual.

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STEREOPTICON TABLES

Distance from Lantern-slide ($2\frac{3}{4}$ " x 3") to Screen in feet.

| | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 |
|----|------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 6 | 6.6 7.3 | 8.9 9.8 | 11.2 12.3 | 13.5 14.8 | 15.8 17.3 | 18.1 19.8 | 20.4 22.3 | 22.7 24.8 | | | | | | | | | | | | | | | | | | | | |
| 8 | 4.9 5.4 | 6.7 7.3 | 8.4 9.2 | 10.1 11.1 | 11.8 12.9 | 13.5 14.8 | 15.3 16.7 | 17.0 18.5 | 18.7 20.4 | 20.4 22.3 | 22.1 24.2 | | | | | | | | | | | | | | | | | |
| 10 | | 5.3 5.8 | 6.7 7.3 | 8.0 8.8 | 9.4 10.3 | 10.8 11.8 | 12.2 13.3 | 13.5 14.8 | 14.9 16.3 | 16.3 17.8 | 17.7 19.3 | 19.0 20.8 | 20.3 22.3 | 21.8 23.8 | | | | | | | | | | | | | | |
| 12 | | | 5.5 6.0 | 6.7 7.3 | 7.8 8.5 | 9.0 9.8 | 10.1 11.0 | 11.2 12.3 | 12.4 13.5 | 13.5 14.8 | 14.7 16.0 | 15.8 17.3 | 17.0 18.5 | 18.1 19.8 | 19.3 21.0 | 20.4 22.2 | 21.6 23.5 | 22.7 24.7 | | | | | | | | | | |
| 14 | | | 4.7 5.1 | 5.7 6.2 | 6.7 7.3 | 7.6 8.3 | 8.6 9.4 | 9.6 10.3 | 10.6 11.5 | 11.6 12.6 | 12.6 13.7 | 13.5 14.8 | 14.5 15.8 | 15.5 16.9 | 16.5 18.0 | 17.5 19.0 | 18.4 20.1 | 19.4 21.2 | 20.4 22.3 | 21.4 23.3 | 22.4 24.4 | 23.4 25.5 | | | | | | |
| 16 | | | | 4.9 5.4 | 5.8 6.3 | 6.7 7.3 | 7.5 8.2 | 8.4 9.1 | 9.2 10.1 | 10.1 11.0 | 11.0 12.0 | 11.8 12.9 | 12.7 13.8 | 13.5 14.8 | 14.4 15.7 | 15.3 16.6 | 16.1 17.6 | 17.0 18.5 | 17.8 19.4 | 18.7 20.4 | 19.5 21.3 | 20.4 22.3 | 21.3 23.2 | 22.1 24.1 | 23.0 25.1 | | | |
| 18 | | | | 4.6 5.0 | 5.1 5.6 | 5.9 6.4 | 6.7 7.3 | 7.4 8.1 | 8.2 8.9 | 8.9 9.8 | 9.7 10.6 | 10.5 11.4 | 11.1 12.3 | 12.0 13.1 | 12.8 13.9 | 13.5 14.7 | 14.3 15.6 | 15.1 16.4 | 15.8 17.3 | 16.6 18.1 | 17.4 18.9 | 18.1 19.8 | 18.9 20.6 | 19.6 21.4 | 20.4 22.2 | 21.2 23.1 | 21.9 23.9 | 22.7 24.8 |
| 20 | | | | | 4.6 5.0 | 5.3 5.8 | 6.0 6.5 | 6.7 7.3 | 7.3 8.0 | 8.0 8.8 | 8.7 9.5 | 9.4 10.1 | 10.1 11.0 | 10.7 11.8 | 11.5 12.5 | 12.2 13.2 | 12.8 14.0 | 13.5 14.8 | 14.2 15.5 | 14.9 16.3 | 15.6 17.0 | 16.3 17.8 | 16.9 18.5 | 17.7 19.3 | 18.3 20.0 | 19.0 20.8 | 19.7 21.5 | 20.4 22.0 |
| 22 | | | | | | 4.8 5.2 | 5.4 5.9 | 6.0 6.6 | 6.7 7.3 | 7.3 7.9 | 7.9 8.6 | 8.5 9.3 | 9.2 10.0 | 9.8 10.7 | 10.4 11.3 | 11.0 12.0 | 11.7 12.7 | 12.3 13.4 | 12.9 14.1 | 13.5 14.8 | 14.2 15.4 | 14.8 16.1 | 15.4 16.8 | 16.0 17.5 | 16.7 18.2 | 17.3 18.8 | 17.9 19.5 | 18.5 20.2 |
| 24 | | | | | | | 4.9 5.4 | 5.5 6.0 | 6.1 6.6 | 6.7 7.3 | 7.2 7.9 | 7.8 8.5 | 8.4 9.1 | 9.0 9.8 | 9.5 10.4 | 10.1 11.0 | 10.7 11.6 | 11.2 12.3 | 11.8 12.9 | 12.4 13.5 | 13.0 14.1 | 13.5 14.8 | 14.1 15.4 | 14.7 16.0 | 15.3 16.6 | 15.8 17.3 | 16.4 17.9 | 17.0 18.5 |
| 26 | | | | | | | 4.5 5.0 | 5.1 5.6 | 5.6 6.1 | 6.1 6.7 | 6.7 7.3 | 7.2 7.8 | 7.7 8.4 | 8.2 9.0 | 8.8 9.6 | 9.3 10.1 | 9.8 10.7 | 10.4 11.3 | 10.9 11.9 | 11.4 12.5 | 11.9 13.0 | 12.5 13.6 | 13.0 14.2 | 13.5 14.7 | 14.1 15.3 | 14.6 15.8 | 15.2 16.5 | 15.6 17.1 |
| 28 | | | | | | | | 4.7 5.1 | 5.2 5.6 | 5.7 6.2 | 6.2 6.7 | 6.7 7.3 | 7.1 7.8 | 7.6 8.3 | 8.1 8.9 | 8.6 9.4 | 9.1 9.9 | 9.6 10.5 | 10.1 11.0 | 10.6 11.5 | 11.1 12.1 | 11.6 12.6 | 12.1 13.1 | 12.5 13.7 | 13.0 14.2 | 13.5 14.8 | 14.0 15.3 | 14.5 15.8 |
| 30 | | | | | | | | | 4.8 5.3 | 5.3 5.8 | 5.7 6.3 | 6.2 6.8 | 6.7 7.3 | 7.1 7.8 | 7.6 8.3 | 8.0 8.8 | 8.5 9.3 | 9.0 9.8 | 9.4 10.3 | 9.9 10.8 | 10.3 11.3 | 10.8 11.8 | 11.2 12.3 | 11.7 12.8 | 12.2 13.3 | 12.6 13.8 | 13.1 14.3 | 13.5 14.8 |
| 32 | | | | | | | | | | 4.9 5.3 | 5.4 5.8 | 5.8 6.3 | 6.2 6.8 | 6.7 7.3 | 7.1 7.7 | 7.5 8.2 | 7.9 8.7 | 8.4 9.1 | 8.8 9.6 | 9.2 10.1 | 9.7 10.5 | 10.1 11.0 | 10.5 11.5 | 10.9 11.9 | 11.4 12.4 | 11.8 12.9 | 12.2 13.3 | 12.7 13.8 |
| 34 | | | | | | | | | | 4.6 5.0 | 5.0 5.5 | 5.4 5.9 | 5.9 6.4 | 6.3 6.8 | 6.7 7.3 | 7.1 7.7 | 7.5 8.1 | 7.9 8.6 | 8.3 9.0 | 8.7 9.5 | 9.1 10.3 | 9.5 10.8 | 9.9 11.2 | 10.3 11.7 | 10.7 12.1 | 11.1 12.5 | 11.5 13.0 | 11.9 13.0 |
| 36 | | | | | | | | | | | 4.7 5.1 | 5.1 5.5 | 5.5 6.0 | 5.9 6.4 | 6.3 6.8 | 6.7 7.3 | 7.0 7.7 | 7.4 8.1 | 7.8 8.5 | 8.2 8.9 | 8.6 9.3 | 8.9 9.8 | 9.3 10.2 | 9.7 10.6 | 10.1 11.0 | 10.5 11.4 | 10.9 11.8 | 11.3 12.3 |

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Publix threw open the doors of another splendid theatre when the new Colfax Theatre opened in South Bend, Indiana. The inaugural performance was held on Saturday night, August 4th, and the show went off splendidly without a hitch.

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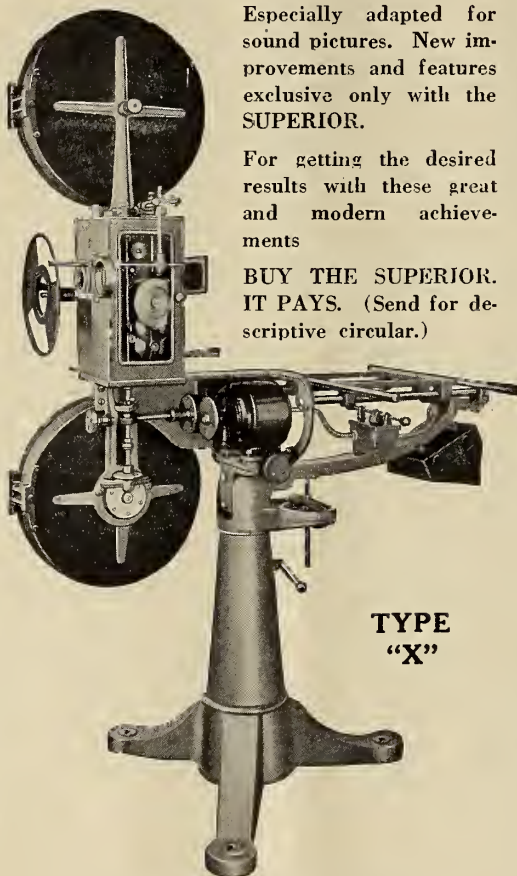
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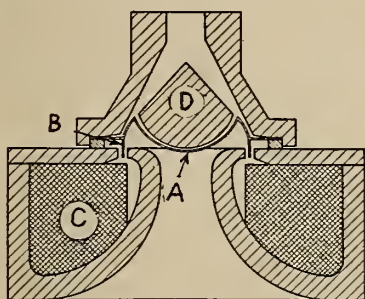
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By FOX-CASE ENGINEERING STAFF

THE loud-speaking receiver used in connection with the projection of Movietone is the Western Electric 555-W. This unit marks a distinct forward step in loud speaker construction, especially from the viewpoint of efficiency and volume of sound produced.

The diaphragm, A in the figure, is made of thin aluminum alloy and the central portion is cupped into portions of two spherical surfaces, which gives it considerable stiffness and makes it move against the air column as a solid plunger. This



Sectional View of Loudspeaker

A—Diaphragm; B—Driving Coil;
C—Field Coil; D—Damping Plug.

diaphragm flexes only near its outer edge and gives considerably better results than the flat type of diaphragm that flexes throughout.

Driving is by means of a single layer coil, B in the figure, of edgewise wound aluminum ribbon, attached to the diaphragm and reacting with the field between the pole pieces of the field winding, C.

The driving coil has high carrying capacity due to its single layer construction, small amount of insulating material, and consequent high rate of heat dissipation.

The cone-shaped piece D is located in front of the diaphragm to shape the tone chamber for proper distribution of the air pressure waves, and this, with the plunger-like motion of the diaphragm, largely contributes to the high efficiency of the unit.

High Efficiency

The efficiency in converting electrical energy into sound energy is very much higher than the ordinary horn unit or cone:—50 per cent as against an average heretofore of only 1 per cent. The power input that this unit will carry is likewise increased:—30 watts on continuous duty whereas the highest heretofore has been in the neighborhood of 5 watts. Combining these two factors it is seen that the sound output energy is 250 to 300 times that previously available, and certainly beyond all comparison with the usual home

radio speaker units with which most of us are best acquainted.

In the use of these units it is important to make all connections exactly as called for, and of course all units will be connected the same way. If the connections are incorrectly made so that the diaphragm of one unit is working in the opposite direction to those of the others, the sound waves will be in opposite phase, and quality will go galley-west.

Hints on Testing

When testing the units one at a time, the horn control panel switch for the unit being tested should be set at 0, or full volume, with the fader turned low not to overload the unit. If a low volume setting at the distributor is used with a high fader setting, the volume may be the same; but using only one horn the impedances of the circuits will not be balanced and the quality will be poor.

In testing the horn units it is well to compare the two lower units with each other, running one after the other or else both at once, and by then doing the same

to compare the two upper units. In this way the balance between them will be verified and any incipient trouble will be detected much earlier than otherwise. In cases of failure, the quality usually begins to suffer before complete failure occurs.

Under normal operation there should be very little trouble with these units, but under continued operation at excessive power something is bound to give way. Do not attempt to play an exit march at full volume through the house curtain which has just fallen. It can't be done except by raising not only the fader but also the amplifier gain control, and that is of course taboo.

Never operate the unit except in connection with a horn, as without the load of the long air column the diaphragm will be free to vibrate so violently as to break internal connections, loosen the coil, or cause damage to the diaphragm.

See that the nut that couples the unit to the horn is made up firmly, and be sure to keep the caps screwed on spare units and to store them in a dry place.

The Exponential Horn

THE purpose of the horn is to afford a coupling between the speaker unit and the outside air, causing the sound energy to be produced at the unit and properly radiated into the theatre. The diaphragm of the unit alone will vibrate to the point of self-destruction without delivering any real amount of sound energy, and it is only by loading it with an air column that we put it to work.

The air column must be small in area at the input end to place an appreciable pressure-load on the diaphragm, and it must be large at the other end to radiate the sound effectively into the free air. For best results the cross sectional area should gradually flare from the small end to the large end, according to an exponential mathematical formula, hence the name "exponential" horn.

In order to effectively handle low notes, the length of the air column must be somewhere near comparable with the wave lengths of the sound; and horns with air columns 12 and 14 feet long, respectively, are used in the reproduction of Movietone. For economy of space and convenience of handling, the horns are curved, as indicated in the illustration.

Proper Location

One or more of the 12-foot horns is located behind the top half of the screen, and one or more of the 14-foot horns at the bottom—middle and high notes predominating in the former and the latter

bringing out the base. If a horn of dimensions such as the latter is required for good base-note reproduction it is readily apparent why the old 20-inch radio horns were somewhat deficient in quality.



An Exponential Horn with Loudspeaker Unit Attached.

In replacing the horns after they have been moved for any reason, be sure to get them back into position exactly as located by the engineers for best sound distribution through the house. The horns should be as close as possible to the screen without actually touching it, and thereby causing the latter to bulge.

Tom Maloy

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Vallen—A Model Factory

IT is an interesting event from time to time to stray from matters effecting the projection room into the factories where projection and related equipment is manufactured.

The first of our visits was to the Vallen Electrical Company plant at Akron, Ohio, where the famous Vallen Noiseless All-Steel Tracks and Curtain Controls are manufactured. This product is known throughout the industry and is justly famed for the efficiency with which it operates the ponderous and costly curtains in the industry's finest theatres.

At the head of this company is E. J. Vallen who though still a young man has already been successfully operating for a number of years the factory which turns out his famous invention. Mr. Vallen is one of the best-known and liked figures in the industry. A visit to Akron which did not include a stop at the Vallen plant would be incomplete.

Fine Modern Plant

The plant is strikingly clean, and one's attention is immediately attracted to the amount of light and air that fills the factory all day long. The machinery is set out in well-disciplined, roomy fashion, allowing each worker freedom of movement and a maximum of comfort. There is a minimum of noise and no rush and bustling. Everything is calm and orderly.

There are no restrictions placed on the workers, each one being left strictly to his own devices. However, the morale is so high, the contentment of the staff so real, that Mr. Vallen does not hesitate to say publicly that he gets a maximum amount of work out of his staff without in any way infringing on their prerogatives as human beings.

Splendid Cooperation

The relations between employer and employee in this factory would seem to offer a goal for many other employers to shoot at. There is not the slightest suggestion of difference between the two by any sort of measurement—economic, social or otherwise. There is a slight suggestion of paternalism but it is graciously extended on the ground of mutual understanding and fellowship.

Thus, Mr. Vallen helps one employee out with a loan to buy a car, so that the worker and his family may enjoy Sundays in the country; and for another he endorses his credit with a reputable jeweler to enable him to buy an engagement ring for his girl. Many of the Vallen employees have thus been the beneficiaries of his sympathetic understanding and cooperation. It is all done on a very practical plane.

The Vallen factory is truly a model factory. It is the best example of the new type of modern industrial methods in the relationship between employer and employee.

Lightning Writes Own Photographic Record

NATURAL lightning, untamed and destructive electricity, that is measured in millions of horsepower and millionths of a second, has been made to write a record of itself, according to a recent despatch to *The New York Times*, which describes the process in detail:

In the foothills of the Alleghany Mountains, near Lake Wallenpaupack, Pa., where engineers of the General Electric Company have been cooperating in experiments on the 220,000-volt transmission lines of the Pennsylvania power and light system for more than three years in an endeavor to ascertain the characteristics of lightning, the greatest enemy of high voltage transmission lines, a photographic record has been obtained showing the nature of a lightning stroke on transmission wires before reaching the ground.

This was the first 220,000-volt line ever built in a lightning infested territory and the first in the world outside of California.

2½-Million Volt Capacity

This picture, taken at noon on July 27, the first of its kind ever made in the world, reveals a stroke on the transmission wires of approximately 2,500,000 volts. It was made automatically by a cathode ray oscillograph, a high-speed camera developed in the general engineering laboratory of the General Electric Company. This device can record what happens in a millionth of a second or even a fraction of such a brief interval.

The negative showed that before five-millionths of a second had passed the voltage wave had climbed to more than 1,500,000 volts. A local disturbance, due to an induction flash over the reflection, caused a rise to 2,500,000 volts in a fraction of a millionth of a second. This splash or ripple then died down in a millionth of a second, and the wave passed to below dangerous value in about ten-millionths of a second and then to zero, all in a total of forty-millionths of a second.

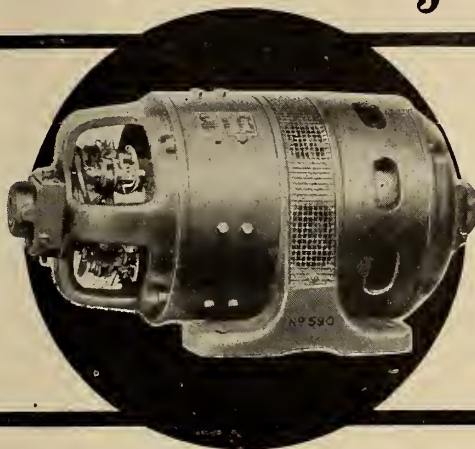
S. M. P. E. Fall Meeting

L. C. Porter, secretary of the Society of Motion Picture Engineers, announces that the Fall meeting of the society will be held at Lake Placid, N. Y., the week of September 24th. The Spring meeting which was held in Hollywood in the early part of May attracted unusual attention to the activities of the S. M. P. E. and it is believed that the Fall meeting will be the largest ever held by the society.

DeVry Speed Lens

The DeVry Corp. has developed a new speed lens for use with the DeVry 35 mm. camera which is used by exhibitors for securing local shots. The new lens is an "F 1.5—50 mm."

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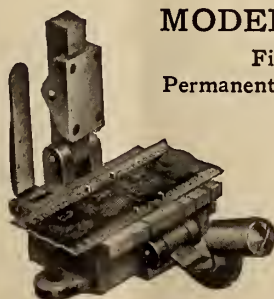
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Detroit's New Film Plan

AFTER more than a year of conferring, deliberating and discussion of ways and means to counteract the nuisance of the many and varied changeover systems now in vogue within the craft, Detroit Local 199 and The Detroit Film Board of Trade have formulated a set of rules and approved practices not only for projection work but also covering the complete handling of film from the exchange to the projection room.

Easily the most important feature of the report is the fact that due recognition is given to the problem of changeovers. The many systems in use today—some of which are recognized as practicable and others which may best be described as the pet theory of this or that projectionist—are conducive to poor projection and, in those instances where the film is improperly handled, are economically unsound.

The chairman of the Local 199 Film Committee is Ira A. Waddell, who, along with his fellow committee members, is deserving of the thanks of all projectionists for his perseverance and hard work in carrying forward the work of improving film conditions.

The following is an extract from Mr. Waddell's letter, enclosed in which was a draft of the proposed new regulations:

... Enclosed herewith please find complete information of what took place here. The report speaks for itself. ... This has taken approximately a year or more to accomplish but has finally been done. The Exchanges have all started marking the film as designated, but it will be a matter of about six weeks before the plan is in full swing, due to the fact that there are so many old prints from which the old markings must be removed.

Eliminate Perforations

The Exchanges are also eliminating the perforating numbering stamps and are substituting the embossing type. For your information, this stamp is the one used by Exchanges to identify their various prints and which, under the old system, often required as much as four inches of film. When this stuff hit the screen, it surely was a mess.

We have received the most wonderful cooperation imaginable from every Exchange in the city; it is cooperation of this sort that makes almost anything possible.

A number of the boys have already received prints marked in the new way, and I have yet to hear a complaint. It is all the other way around: they are very enthusiastic about it.

... I trust that you can use this information in THE MOTION PICTURE PROJECTIONIST, either in whole or in part. I shall be glad to hear from any of the boys throughout the country who may wish to comment on the plan. Another portion of Mr. Waddell's letter is included later on in this article in con-

nection with the use of the punch mark as a changeover cue.

General Recommendations

An indication of the broad scope of the work is contained in the following letter sent out by the Detroit Film Board of Trade to all member exchanges.

At the last meeting (of the Board) the question of print conditions was gone into at length by a competent authority on the subject. We again call your attention to the forms provided for reporting serious damage to your prints, which may be secured at this office, and urge you to have your inspectors use these forms and file them promptly with this office.

Among the recommendations made for the bettering of conditions on prints were the following:

(1) That the bands on each reel be sealed at the back of the button so that the loose end of the string is outside of the seal. If this is not done, it is impossible to open the reel without destroying the band entirely.

One Inspector

(2) Have the same inspector work on a new print for the first ten times it comes back, in order that she may determine accurately the theatres placing punch marks at the ends of reels.

(3) Have your inspectors watch for unscrapped patches, which may be detected by holding the print to the light, as they are considerably darker than a regular patch, and remove this immediately and repatch properly by scraping the film.

(4) Be sure that your leader on each reel is at least 4 feet long, as otherwise your actual print will be damaged in the threading operation. Use opaqued leader at the end of reels.

(5) Destroy at once reels that are out of true. These may be detected by having your inspector spin the reel on a rewind.

(6) Have your shippers clean out the film cases before refilling, by turning them over and dumping out the dirt and rubbish.

(7) Have your inspectors empty out small bottles of cement every night and refill with fresh cement each morning.

Room for Improvement

The foregoing recommendations for exchange work are excellent. One may wonder, however, at the necessity for listing a majority of the suggestions. Damaged prints having been a bone of contention for years between projectionists and the exchanges, one might assume from the arguments put forth by the exchanges that all these things, and more, were being done. One learns, however, that there is still room for improvement in exchange work—and with pardonable satisfaction that the projectionist cannot have been wholly at fault all these years.

Considering briefly the highlights of this group of recommendations, there appear three points which are very important: (2) Having the same inspector work

on a new print for the first ten times it comes back. This is an excellent suggestion and undoubtedly will serve to fix the responsibility for print mutilation; (5) Destroy at once reels that are out of true. The importance of this point is apparent; all projectionists are familiar with the damage done by poor reels; (6) Have your shippers clean out the film cases before refilling. Should have been done regularly.

Uniform Changeover

We come now to the most interesting feature of the report—the suggestion for a new uniform changeover cue. The gist of the new plan may be gathered from the following bulletin of the Film Board to all member exchanges:

... A plan has been worked out by the Detroit M. P. Operators Union Film Committee to eliminate the changeover-cue-mark nuisance. The plan submitted below has the approval of experienced projectionists in Detroit as practical and workable, and all projectionists and exhibitors in the territory are urgently requested to assist in carrying it out.

Starting at once and as fast as the prints can be so marked, each shipping case containing a print marked with the uniform changeover marking will carry a yellow label inside the cover of the shipping case as follows:

IMPORTANT!

PROJECTIONISTS:—

This print bears this "O" mark in the upper left corner of one frame, on the end of each reel, for your use in making your changeovers. It appears five feet from the end. DO NOT cut it out or add any other marks, otherwise you will be charged the cost of replacing the complete scene so marked.

Detroit Film Board of Trade, Inc.
Detroit Motion Picture Operators' Union.

This office (Film Board) is supplying member exchanges with the above labels. Each Inspection Room will be supplied with one circle punch for use on their prints. The system operates as follows:

(1) Starting with a certain date, have your inspectors place one punch mark on the upper left-hand corner of one frame about five feet from the end scene in every reel. Be sure the punch mark is approximately $\frac{1}{4}$ " from the edge of the scene on account of some projectors having narrow aperture plates. All other changeover marks must be removed.

(2) Place the yellow label on the inside cover of the shipping can.

(3) Do not punch the new prints until after the first run in Detroit, as they use a cue sheet for changeovers and object to any punch marks.

(Continued on page 24)

Setting the Shutter on Motiograph

SINCE the announcement of the new Model H. Motiograph De Luxe projector, many inquiries have been received from projectionists inquiring the method of setting this new shutter in time.

Evidently these inquiries have been prompted by a belief that the new shutter would present difficulties or be difficult to set correctly. This is entirely an erroneous idea, as the new shutter is not only very simple to set but the operation may be accomplished with more ease and speed than that of timing the old type revolving disc shutter.

The new shutter is provided with both methods of setting, as with the old type shutters. That is, the shutter may be set either while the mechanism is in operation or when not running.

At such times when the intermittent movement has been removed or replaced for emergency or repair, the operation of setting the shutter is accomplished as follows:

Preliminary Work

Insert the movement in the mechanism, locking it firmly in position, paying no attention at this time to the setting of the shutter. After the movement is in place, remove the cover over the gearing of the horizontal shutter. This is easily accomplished by slightly loosening the screw at the top of the gear housing. This is the thumb screw which has the oil cup on top of it.

One will then note a large flat-headed screw retaining the drive gear on the shutter shaft. Loosen this screw one turn, holding the shutter blades with the fingers to prevent the shutter turning. This will free the shutter from the gear and the shutter may now be revolved independently of the drive mechanism.

Immediately under the gear on the shutter shaft is another gear called the gear on

(Continued on page 28)

New Oliver Speedometer

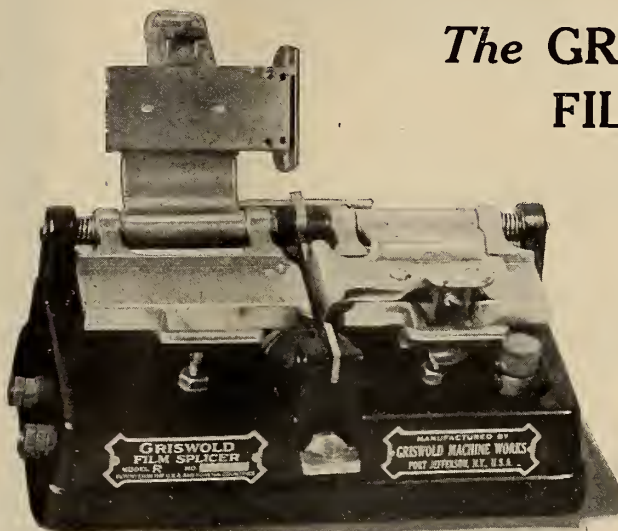
The Oliver Speedometer is another innovation in projector accessories. The designers of this speedometer, E. E. Oliver and L. J. Shafranek, being projectionists of long standing, have realized for a long time the need of a moderately priced instrument which would be within the reach of all.

This instrument is an accurate device of the magnetic type which runs freely and will cause no wear on projector parts. It is easily connected by cable to the shutter-shaft of the projector and will eliminate any back-lash of the shutter.

The Speedometer, which can be placed handily on the front wall, registers feet per minute and minutes per 1,000 feet of film, enabling the projectionist to keep on schedule and finish his show on time. This is important, particularly in vaudeville. It is of great importance in running synchronized sound pictures.

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Detroit's New Film Plan

(Continued from page 22)

... (5) Make an accurate check-up through your inspectors for a period of at least two weeks from the installation of this system, with particular notice for other cue marks. . . .

Obvious Shortcomings

Chairman Waddell has the following to say about this new system:

I will admit, however, that even the punch mark is not the ideal changeover. A changeover I would like to see adopted would be the one now used by Vitaphone and Movietone, namely either a title or a scene with no moving objects, one reel to end with the scene or title and the next to begin with its duplicate.

As stated by Mr. Waddell this new Detroit plan has its shortcomings. Aside from the undesirability of any sort of a punch mark on film, several flaws in the plan suggest themselves at once.

First the punch mark is much too close to the end of the reel. There is absolutely no provision made for guarding against a white screen should the projectionist miss the cue. Merely a turn of the head would be enough to cause missing the cue entirely, with the remaining five feet allowing altogether too little time in which to rectify the error.

As for the punch mark itself, much may be said against the practice. The present trend in projection circles is away from any practice that will mar the film. The Film Board statement says that "this flash will appear so briefly on the screen that no one in the audience will notice it, but the projectionist, who is looking for it, will have no trouble seeing it."

Flash Is Objectionable

It would seem that if the flash will be easily apparent to the projectionist, the audience would have at least one-half the same chance to notice it. Laymen are becoming more and more acute in their sense of the mechanics of picture making and projection, and there exists considerable doubts that even a quick flash would pass unnoticed by a discerning audience.

Should a theatregoer notice the flash regularly he will eventually come to associate it with the mechanics of projection and finally—possibly subconsciously—will come to watch for the telltale flash. And with that expectancy will come the break in the illusion that spells disillusion.

Discrimination

Further, it is important to note that the punch will not be made until *after* the first-run. The unfairness of this is apparent. A reasonable query would be "Why don't the first-runs use the system" and the answer immediately suggests itself. First-runs *do not* want that flash, however minute it may be. Their experience in show business has taught them that such methods are poor business.

And naturally the thought arises that that which is not good enough for first-runs is equally deficient for subsequent runs. Discrimination of this sort is unfair. The effects of the punch mark on

the lighting qualities of any particular scene—whether it be one of brightness or one of sombre hue—would not be tolerated in a first-run house.

Lastly, there is the mutilation of the film to be considered. Mutilation of film under any conditions is not in high favor these days. Further, the punch mark tends to weaken the structure of one particular frame, with results that may not be accurately forecast.

Six of One—

All in all, it would seem that the plan merely has accomplished the substituting of one nuisance which is as harmful as the half-dozen or so nuisances formerly existent. The projection chief of one of the largest theatre circuits in the world characterized the punch-mark plan as "a lazy man's habit." He went on to say that the best-known changeover plan yet devised was that of using a certain scene as a cue and, if the scene is long enough, a certain movement within that scene for exactness. Every projectionist surely examines his show before running it through. And it requires only a little more time in which to jot down the scene cue at the end of each reel. Automatic changeover devices have simplified the problem enormously; and if the punch-mark plan necessitates the projectionist being on the alert for the flash cue, might he not just as well accomplish the same thing by identifying a certain scene?

Scene Change Best

Accuracy might not be achieved on the first show, but the second and subsequent runs would be wholly satisfactory. One Broadway house ran a feature for two weeks in which there was a changeover on *one frame*. And the change was made perfectly each time. This is an extreme example, yet the degree of accuracy attained would seem to indicate the possibility of accuracy with a scene of, say, 15 feet.

The easiest changeover, of course, is that from a fadeout. Title changeovers are very difficult. Scene changeover cues are generally regarded as the best known plan. Every projectionist owes it to himself and to his work to willingly give what little time is required for the cueing of a picture.

Penalty Prescribed

Another undesirable phase of the Detroit system is the penalty prescribed for additional markings and mutilation of the print. While it is expected that any plan of this sort must be rigorously enforced to secure satisfactory results, and while no enterprising projectionist would willingly mutilate a print, the Detroit plan makes no provision for protecting the projectionist against misdirected charges of abusing film.

With the exception of the punch-mark plan, the report is of great value for bettering film conditions. Co-operation of this sort between exchanges and local unions is gratifying, and similar conferences might well be inaugurated throughout the country with much benefit accruing to the movement for better film conditions.

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A Liquid Tube That 'Sees' and Transmits Colors

A NEW type of electric eye, for use in the electrical transmission of pictures, has recently been announced and demonstrated by the Radio-vision Corporation of New York City.

In a special demonstration the new cell, operated from the light ray of an ordinary match and with higher intensities of light, furnished enough current to operate sensitive relays, directly, without additional amplification.

This new device, that may be termed a "photo-voltaic" cell, was invented by Samuel Wein, long known as a pioneer in light-sensitive development and research work. This newest addition to the art "offers much greater efficiency and speed in converting light into electrical impulses, and will probably hasten the development of picture transmission, both of still pictures and television immeasurably," according to the inventor.

Built in the form of a vacuum tube, the cell consists of two specially shaped electrodes of metal, inclosed in a clear glass bulb almost totally filled with a slightly greenish liquid that forms the electrolyte. The two electrodes are coated with a sensitizing film that is directly responsible for the action of the cell.

Differs From Previous Apparatus

The new cell does not follow the ordinary accepted forms of light-sensitive cells, now generally used for this purpose, but utilizes the little known principle of the photo-voltaic effect for its operation.

So-called photo-voltaic effects have been known to exist in practically all types of



Pictured above is the liquid cell fashioned like a vacuum tube.

batteries to a very limited extent. Batteries, as is well understood, consist of two terminals or electrodes, one positive and one negative, immersed in a liquid or semi-liquid solution, called the electrolyte. Through electro-chemical action, which means a chemical disintegration, an electric current is generated that can do work. Another current that flows in a battery in minute quantities is the photo-voltaic current that is generated therein by reason of light falling on the electrodes and causing a further chemical change in the surface of the electrode.

This current was heretofore of such a small proportion of the total current that it was difficult to detect and extremely impractical to separate and use alone. This is where Mr. Wein has succeeded in his researches. He has produced a small battery made up in a glass bulb in the outward form of a radio tube in which the photo-voltaic effect is much greater than the purely electro-chemical effect, which has been almost entirely eliminated.

Tube Has Increased Sensitivity

The great sensitivity of the new device is shown in the curve shown on this page. It will be noticed that the new "tube" is very sensitive in opposite directions for two particular ranges of the light spectrum—yellow and violet-blue. (Voltages in excess of .0003 volt were measured with a light value of ninety-foot candles.) The response is high in both directions, being positive for the yellow range and negative for the violet blue. These separate ranges can be used singly by means of light filters.

Other Types of Cells Used

There are two other general classes of light-sensitive cells known to the art. First, is the type of cell that makes use of the

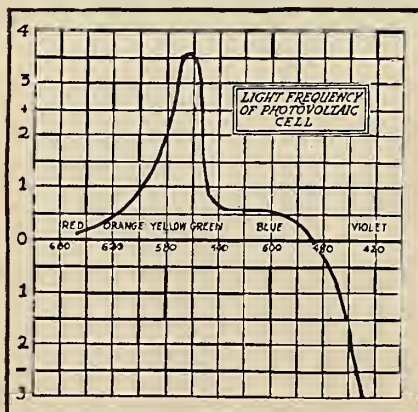
earlier discovered actino-electric effect. In this type of cell an active element, such as selenium, one of the metallic sulphides or of certain oxides, is exposed to light, thus causing a change to take place in the electrical resistance of the cell. When connected in a circuit with a battery this produces a current flow that varies in intensity in accordance with the strength of the light falling on the sensitive portion of the cell.

This phenomenon is purely a change of resistance of the cell in response to light. Such a cell is sluggish in operation and will not function quick enough for television work, although it is quite sensitive and has been used very satisfactorily where speed is of little account.

More Speed Necessary

The cell that has been almost universally used for electrical transmission of moving images is a third type of cell, operated on still another principle—that of radiation of electrons from the surface of a coating of specific alkali metals when placed in a vacuum, or partial vacuum and subjected to rays of light.

In general appearance it is a glass bulb coated with a silvery covering on the inside of one-half of the bulb. This coating is employed as the radiating electrode, the liberated electrons being gathered by another electrode also placed within the bulb—a collector. When the cathode and the anode, the technical names for the two electrodes, are placed in a suitable circuit a feeble current will flow when light falls on the cell. This is photo-electric current that follows the various changes of light with practically little inertia. The currents obtained, however, are extremely weak ones and have to be amplified greatly before they can be used for practical television work.



This curve chart shows the electric response of the "photo-voltaic" cell to light colors of various frequencies.

Colored Motion Pictures

By M. A. SHELDON, Phd.,

Professor of Physics, New York University

NOW we can all take colored moving pictures, and that brings up many questions. If it is so simple to take colored "movies," why can't we take colored still pictures as well? How have those who have been taking colored pictures been doing it in the past?

There have been three fundamental ways of getting a colored picture. These might be called the Maxwell, Lumiere, and Lippman processes. They are all based upon the physiological fact, discovered by Helmholtz, that the eye is sensitive to three primary colors and all others are made up of suitable combinations of these. White is a combination of all three, and black is a total absence of all light.

First Colored Picture in 1861

Utilizing this fact, Clerk Maxwell, famous for his theory that light is of electro-magnetic origin, showed the first color picture before the Royal Institution in England in 1861. His picture was made up of three separate exposures. One was taken through a green fluid to filter all but the green light, one through a blue filter and one through a red. By means of a projection apparatus using three lenses and the same filters as before, he was able to project the one on top of the other, resulting in mixing the colors and thus giving an image of the original object in something of its true color.

This would depend upon whether the three plates were given the proper exposures, which would not be the same in all cases, as the sensitivity of the plates differed from different colors. Modern panchromatic plates, equally sensitive to all three colors, are now attainable, and so this process is simplified. Cameras which take all three pictures at once also have been devised.

Tangled Colors

If this system were to be used for motion pictures it would require that three films should be taken simultaneously and run in synchronism. It is to be noted that the film would have no color of its own, but in the case of the "red" film, where red light struck the negative, the corresponding positive would be transparent and would allow light to pass through, red light being used. If the wrong filters were used with the film the result would be ridiculous, but amusing. Green flowers might bloom on red bushes.

Such colored pictures are confined to projection purposes, and because of the expense of running three films they have been little used. A compromise between the three, resulting in two pictures, one on either side of the film, have been used, but the taking and printing are complicated.

The next advance was to combine these three plates into one. This can be done by ruling fine colored lines on a filter plate, so close together that at a distance they cannot be distinguished. This is somewhat similar to newspaper pictures, in which the prints are made up of a number of fine dots, which are evident upon close scrutiny but are not troublesome. This was first used in 1892, when glass plates were ruled 200 to 300 to the inch with red, green and blue lines. The photographic plate was placed behind this, exposed and then projected on a screen through the same filter used in photography.

It is obvious that if such a plate were slid sidewise behind the ruled filter or grid that the colors would be false. As the distance tolerable was less than one two-hundredth of an inch, it is obvious that it would be difficult to line these up, especially in a motion picture machine.

Lumière Process an Advance

An improvement on this is known as the Lumière process. This avoids the necessity of ruling the filter by sprinkling dyed transparent starch grains haphazardly over the filter plate. Each starch grain allows only its color to go through and affect the sensitive photographic emulsion behind it. If the starch grains are placed right on the same plate with the emulsion they will always remain in position with respect to the plate and can be projected on a screen at will with no troublesome adjustments. This requires no special equipment and can be used in any camera. The cost has been its drawback.

The Lippman Process

Undoubtedly the most ingenious process and the most interesting theoretically is the Lippman process. This employs the wave characteristics of light. It is well known that if a wave is turned back on itself under proper conditions it will split itself up into regions of maximum vibration, called loops, and regions of minimum vibrations called nodes.

If light passing through a photographic emulsion its turned back by a mirror in this way the nodal regions do not affect the emulsion, but the loop regions do. This leaves, on development, a kind of cellular arrangement of multiple layers which,

when viewed at the proper angle in white light, breaks the light up into the component colors which originally struck the plate. While theoretically this is the ideal color plate, it is of no practical value, as the colors are faint and the viewing angle critical.

The Eastman Procedure

The newest Eastman process has avoided most of the difficulties of the older ones. The film differs from that ordinarily used in having the side presented to the camera lens corrugated lengthwise the film, with ribs of the shape of cylindrical lenses, so narrow as to be invisible to the naked eye.

The emulsion side is away from the lens. The camera lens performs the same function as usual in creating an image of the object on the film. The cylindrical lenses embossed on the film are of such a focal length as to cast an image of the camera lens on the emulsion side—a very short focus. Now, if three color filters are placed in front of the camera lens, in juxtaposition, they will each allow a band of color to fall upon the lens, and the image falling upon the sensitive emulsion will then be divided into three narrow bands running lengthwise the film for each embossed lens. If only red is present for a particular spot on the film corresponding to a spot on the object being photographed, then at that point only the red portion of the lens image will strike the film and upon development only this portion of the film will be affected. When the negative is converted into a positive (it is not printed) this will be a transparent spot.

When the film is projected the path of light is just the reverse to that when the photograph was taken and the rays fall on the screen in the order in which they appeared on the original object.

Converting the Camera

To convert the ordinary motion picture camera into a color camera requires only a tri-colored filter, which slips into place in front of the lens. The drawbacks to the system are that only one picture is made, whereas the motion picture producer requires two or three hundred. Also the filter cuts the light intensity down to such an extent that the screen is limited to sizes too small for theatres. It is ideal for the amateur at present, and the objections of the professional will doubtless soon be overcome.

First American Photo

The advance in camera work made since the time of Professor Draper, of New York University, who, in 1850, took the

(Continued on page 31)



I. S. PERSE

CAPITOL MOTION PICTURE SUPPLY CO.
727 Seventh Avenue New York City

What is a GUARANTEE

If it is not backed up by the reputation of personal integrity, loyalty to one's customers and service under all conditions and emergencies?

OUR supplies are ALL sold with that kind of a Guarantee. Our satisfied customers are too numerous to count.

We sell Strong Lamps — Sure-Fit Parts — Snap-Lite Lenses — Balluna Spots — Super-Lite Screens — Robbins & Myers Generators and other product of the same high standard.

Natural Color Process on Market Soon

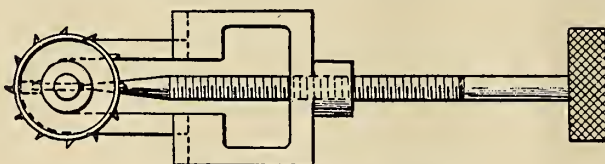
Color films, made by a color filter composed of seven color segments instead of the usual three, will be marketed within two weeks by Natural Color Pictures Co. The invention is the product of O. J. Grady of Newark, who says he has been working on the process for more than eight years.

The process can be used for both professional and amateur work, as it employs ordinary film. It utilizes a disc of multi-colored gelatin, which replaces the usual shutters used on camera and projector.

The color disc attachment, revolving in front of the film, behind the lens, registers on alternate exposures in which reds are basic and on the other colors in which blues predominate. These, projected on the screen at a speed slightly faster than that for ordinary black and white pictures, alternate so fast that all the colors appear to be present at the same time. The film can be duplicated in unlimited quantities, it is claimed.

ATTENTION PROJECTIONISTS!

New Intermittent Sprocket and Pin Press



Patented Nov. 16, 1926, No. 1606830.

Every Projectionist can remove and replace worn intermittent sprockets easily, quickly and efficiently with this new instrument.

CAN BE USED ON ALL PROJECTORS INCLUDING POWER'S... PRICE \$8.50

Illustrated booklets with instructions sent free to all projectionists on request.

PROJECTION IMPROVEMENT CO.
DRIFTON, PA.

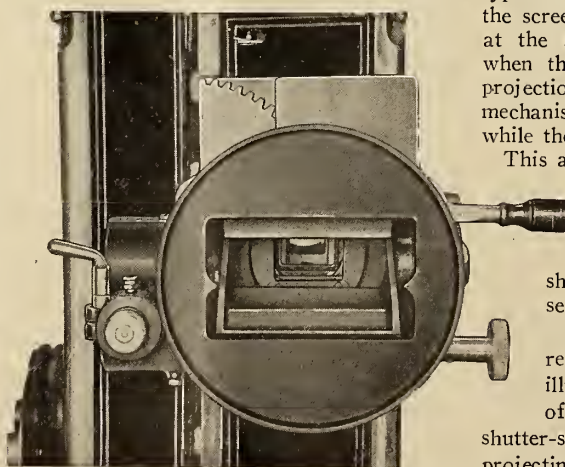
Motiograph Shutter

(Continued from page 23)

the shutter drive shaft. Before attempting to set the shutter, see that this gear is positioned so that it is centered directly under the gear on the shutter-shaft. This is accomplished by loosening the nickel-plated clamping handle over the shutter-drive shaft bearing. Then by turning the shutter setting knob on the opposite side of the shutter housing, this gear may be positioned as directed. Tighten the clamping handle again and the setting of the shutter may be done as follows:

Setting the Shutter

Turn the balance wheel of the movement in its proper rotation until the intermittent sprocket is just starting to move. Hold



Close-up rear view of shutter

the balance wheel still in this position. See that the horizontal shutter is in the "open" position—that is, so that the light beam would pass through it to the aperture—then turn the shutter so that the top vane turns toward you until the first edge appearing is in line with the two indicating points on either side of the rectangular opening of the shutter housing.

In the accompanying illustration the shutter is in the open position and the edge of the top vane is visible part way down from the top of the rectangular opening of the shutter housing. It is this edge which is turned toward you until it is in line with the two points which are clearly shown on each side of the rectangular opening at about the center.

When so positioned, the large flat-headed retaining screw retaining the gear on the shutter shaft is re-tightened and the operation of setting the shutter in time with the intermittent movement is completed.

Exact Timing

It may be necessary, however, for exact timing of the shutter to refine the adjustment just made, and this is, of course, best accomplished (as is true also of the old type shutter), by projecting the picture on the screen and having some one positioned at the screen to signal the projectionist when the shutter is in exact time. The projectionist manipulates the shutter-setting mechanism provided for setting the shutter while the mechanism is in operation.

This adjustment is made by first loosening the nickel-plated clamping handle on the shutter drive shaft bearing, as explained before, and adjusting the shutter as desired with the shutter-setting knob.

The nickel-plated clamping handle referred to is plainly shown in the illustration at the extreme left side of the shutter housing, while the shutter-setting knob is also clearly shown projecting from the right side of the shutter housing at the bottom.

Rehearsing Sound Pictures

By Western Electric Engineering Staff

IN order to give a satisfactory performance with either synchronized or non-synchronized presentations, adequate rehearsal is necessary to cover the various points which will be listed. Attention is drawn in this connection to the following clause of our standard contract with theatres, regarding the use of synchronous equipment:

"2 . . . The Exhibitor agrees that prior to the first public use in the Theatre of each film and/or record it will cause such films and/or records to be run privately upon the Equipment for the purpose of ascertaining that the Equipment is in satisfactory condition and adjustment for the particular film and/or record . . ."

The House Manager should be present at these rehearsals with an observer at the telephone set. The subjects should be run off in the same way as for an actual performance. Time spent in careful rehearsing will be amply repaid in the perfection of the show, and the actual presence and interest of the house manager is indispensable.

Light effects and any special features of the forthcoming show should be considered and tried out in conjunction with the rehearsal procedure described here.

Procedure

On first reel of each synchronized feature picture and on first of each group of short subjects shown, determine how soon after starting motor fader should be

brought up to its full setting. It should be brought up slowly, taking two or three seconds, and should reach this point just before the voice or music begins.

For remaining reels of a feature, determine how soon after change-over fader should be brought up to its full setting. Usually this will be immediately after change-over.

For short subjects, determine how soon after end of voice or music accompanying each subject the picture should be faded out.

On second and following subjects, determine when motor of incoming machine should be started to allow proper time interval between subjects, and when fader should be brought up to its setting to catch incoming music.

Three Horn Combinations

Three different types of combinations or settings of the upper and lower horns are used, and designated respectively by the letters "A," "B," and "C."

The "A" setting is for vocal and instrumental solos or speech and uses upper horns only or upper horns with some lower horn.

The "B" setting adds more lower horn to bring out effect of orchestral accompaniment.

The "C" setting is for orchestra alone and carries further result mentioned for the "B" setting.

Inasmuch as the settings are determined by careful tests of the house they should

be followed without change. Other settings than recommended may throw system out of balance electrically and overload it or distort sound.

Settings Marked on Record

As a matter of convenience, and in order to give the theatres the benefit of the opinion of the recording and engineering staffs, recommended fader and horn settings are frequently marked on records or films or given on cue sheets sent out with them. Our engineers so adjust the amplifiers that with a full house, and fader setting recommended, correct full house volume is obtained. With house only partially filled fader should be brought down one or two steps.

Determine horn settings and empty house fader setting for each number, bearing in mind any recommendations marked on or accompanying record or film. Do this with care, and in particular do not permit too high a volume. Synchronized scores to feature pictures should be run at a volume appropriate to *incidental* music.

Variations of Volume

Speakers talking at a distance or in conversational tones should be reproduced with less volume than those speaking close or obviously talking loudly. Instrumental solos should have less volume than full orchestras (not accompanying), bands, etc. In news reels, street noises, locomotive whistles, etc., should be loud to give correct illusion.

In certain records effect may be improved by bringing fader up or down a step at certain points in the picture, as just mentioned. Even the horn settings may occasionally be changed during a number as record changes from light or vocal effects, which are best reproduced by upper horns, to heavier orchestra music for which lower horns are brought out.

However, discretion must be used in not making too great or too frequent changes in horn and fader settings; each record is made under skilled musical and technical direction in such a manner that when it is reproduced the effect desired by composer, artist, and conductor will be obtained without any need for frequently changing settings while playing. If they are changed too much, therefore, proper effect will not be obtained.

Communication Code

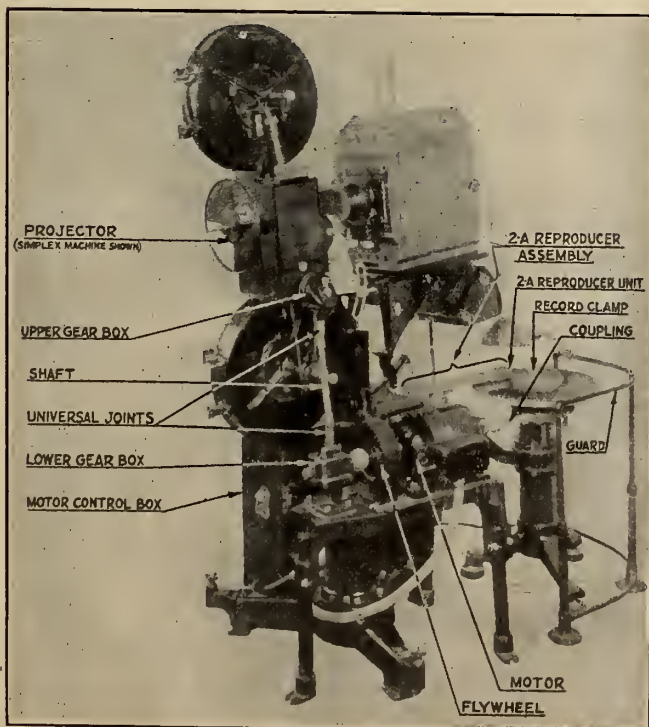
Having rehearsed show and determined all settings, curtain cues, etc., record them in the form of a cue card posted in the booth.

In communicating with the projectionist by means of the telephone set it will be found handy to use the buzzer, with the following code:

One buzz: Fader up one step.

Two buzzes: Fader down one step.

Three buzzes: Answer over telephone.



View from driving side showing projector with turntable equipment, connecting shaft, motor, and other attachments



The Oliver Speedometer

An accurate, magnetic type instrument for indicating Projector speed in feet per minute and minutes per 1000 ft. Quickly installed.

Price \$15.00 Complete

Sold by the best supply dealers

OLIVER MANUFACTURING CO., Cleveland, O.

If your dealer cannot supply you, write us

Suggested Shutter Improvement

BELOW there appears a copy of a letter, written to an English trade paper recently by Mr. D. Dear, who is attached to the X-ray Department of a military hospital in Jamaica, West Indies, and who has conducted numerous experiments in the direction of increasing the efficiency of the projection shutter. His letter follows:

During the last ten years various types of shutters have been employed to minimize as far as possible even a semblance of eyestrain. But to entirely eliminate eyestrain, from the medical point of view we should have to employ a shutter made up of entirely translucent material. But in so doing, a number of technical difficulties arise, such as "travel ghost," halation and loss of crisp focus.

We must, therefore, find a medium that will (1) be of sufficient density to overcome these difficulties, and (2) be of sufficient transparency to eliminate eyestrain due to the violent change from the black to the light period. We must, in fact, strike upon a material neither opaque nor transparent to take the place of the masking shutter blade—sufficient, that is, to allow to a definite degree the penetration of light, but efficient enough to absorb visual wave-lengths while the intermittent movement is taking place.

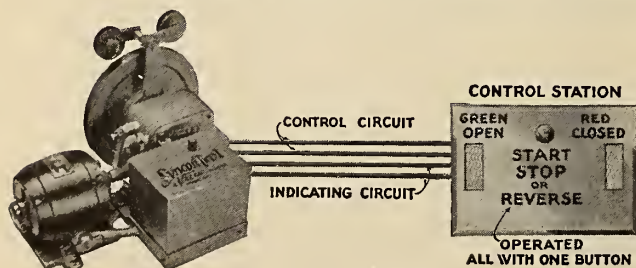
Now, what I would suggest is to employ (in the case of disc shutters) a disc of optically good glass, such as, for instance, plateglass of 1/4-inch thickness and bevelled edge. This would correspond in size to the normal shutter now used. Two-fifths of the surface of this glass surface would be perfectly clear, and the remaining three-fifths frosted from infinity to maximum and from this stage down again to infinity. The principle could be adapted to outside, inside and cylindrical types of shutter.

It may be concluded that with such a shutter the resultant picture would not be in crisp focus, but by simply shifting the lens jacket, or carrier, to a position in front of the masking shutter and then focusing from that point, the difficulty would be overcome with comparative ease.

[Editor's Note: This item, together with the drawings illustrating the operating principles of the plan, were submitted to several leading projectionists for comment. The plan as presented above prompted several objections. First, it is said to involve a tremendous loss of light, due not only to the quality of glass suggested but also to the plan of the shutter. Second, it would seem to predicate distortion, possible only to a slight degree but enough to mar the picture. Third, the shutter would necessarily have to run at twice the speed. The quality of glass suggested is also a serious fault of the plan.]

Valle Now Offers You **Syncontrol** A VALLEN PRODUCT TRADE MARK

CURTAIN CONTROL TIMED EXACTLY FOR VITAPHONE, MOVIE TONE, OR ANY SYNCHRONIZED PICTURE.



The Projectionist knows the position of curtains at all times by means of indicators in booth,—permitting perfect synchronization of sound, scene, and curtain.

VALLEN ELECTRICAL COMPANY

Akron, Ohio

Read publicity article on Syncontrol-Motion Picture News' August "Showman."

How Many

New subscribers have you secured for **THE MOTION PICTURE PROJECTIONIST**? Introduce your friend to the craft's only paper. Take advantage of the present low subscription rate—\$1.50 per year.

Television Advances in Recent Tests

Progress in the television field has been very rapid during the past 30 days. Within the month several tests were made which demonstrated in forcible fashion that this new science developed rapidly and will shortly emerge from the laboratory stage and be applied to common use.

Perhaps the most important recent demonstration of this science was that which was given at the Westinghouse Electric and Manufacturing Co. plant in East Pittsburgh, Pa., where Dr. Frank Conrad, television expert, has done much experimenting in the radio-vision field.

This test successfully demonstrated the practicability of sending pictures by radio over long distances. While transmission in this particular test was only over a distance of 3 miles, the engineers in charge of the test said that the distance spanned might easily have been 100 miles or more without loss of efficiency.

Dr. C. Francis Jenkins, of Washington, a tireless worker in the radio-vision field, announced recently that he looks for a speedy development in television processes, with the science to be firmly established in common usage within the next three years.

Electricity Does the Work of 3 1/2 Million Men in the United States

At the end of 1926 the installed generator capacity of electric light and power plants in the United States was in excess of 25,000,000 electrical horsepower, and as an electrical horsepower is equivalent to the work of about fourteen able-bodied men, this capacity represents the work of about 3,500,000 men with the added advantage that while the generators can work continuously for twenty-four hours each day, an able-bodied man quits at the end of eight hours.

These companies serve approximately 18,000,000 domestic customers. One out of every four of the inhabitants of cities and towns in New England is a customer of an electric light and power company.

"Sound" Service Stations

Six sound picture service stations in as many cities that will serve as hubs of sales areas, have been established by United Artists. The stations are in company exchanges at New York, Chicago, Atlanta, Dallas, Kansas City, and San Francisco. All stations are now in operation.

Colored Motion Pictures

(Continued from page 27)

first photograph of a human being made in America, has been one of the most interesting stories imaginable. Then an exposure of six minutes in bright sunlight was necessary to get an impression.

Now ultra-slow motion pictures of several hundred a second are possible. Colored films will soon be possible. Films with a voice record on the side are in daily use. Stereoscopic pictures have been produced. How long before colored, talking, stereoscopic pictures will be sent into our homes by radio-television?

For the Best in Projection Apparatus USE CHICAGO CINEMA DE LUXE EQUIPMENT

De Luxe Effect Machine

- " Double Dissolver
- " High Intensity Flood
- " Arc Spot
- " Effect Discs—Electrical—
- " Automatic Rewind—Underwriters Approved

Will be found in most of the new Theaters, thruout the country, opened since Jan., 1927.

Such Popularity Must Be Deserved!

A NEW CATALOG—No. 40—of this and other lighting equipment just off the press. Write for your copy.

CHICAGO CINEMA EQUIPMENT CO.

1738 No. Springfield Ave., Chicago

HEWES ADJUSTABLE SPOT LAMP JAWS

will place your present type lamp in the \$300 class, but lacking the bulk. These jaws operate up and back and sideways; the top and bottom are interchangeable, the set screw is always toward you on right- or left-hand doors. Built to last, and will carry 75 amperes. \$6.00 the set, ready to install.

Genuine 2 in 1 Film Cement

—VITRO Lamp Colors—Perfumes—Crystal Fumes, Stage Lighting Equipment—Effects, Etc.

Made by

HEWES-GOTHAM CO., 530 West 50th St., New York City

Complaint Department

PROJECTIONISTS continue to take advantage of the maintenance of the Complaint Department, and complaints are beginning to roll in from all sections of the country. What has been said in past issues about the use of this department by projectionists is reiterated: Each and every projectionist who has to contend with bad film should utilize fully the service provided by this department.

Too often a projectionist relies wholly upon the theatre manager to effect improvement in film condition; but too often the manager is preoccupied with the latest tally from the box-office and is more or less unconcerned with the projection room—a majority of managers failing to grasp the essential fact that the projection room and the box-office are interrelated very closely.

Use the Department

The promise made when this department was instituted still holds good: That any projectionist anywhere is urged to submit to this department his complaint on poor film conditions, and may rely fully upon this department preventing a repetition of the trouble.

Below appears a complaint from Secretary George Reese of Local 568, Columbus, Georgia:

Taking advantage of your complaint department and thinking that it is every projectionist's duty to try to get better service from the film exchanges in the matter of better prints, I am enclosing herewith some cuts from a new serial which we are showing which is distributed by the Eltabran Film Corp. of Atlanta, Georgia.

The entire print was as bad as these few cuts and was sent out from the exchange in this condition. Any exchange that would send out film in this condition is utterly lacking in business judgement. As for me, I'm in favor of a bonfire with all this junk.

I have seen some cuts from other exchanges sent to other theatres in this city, and it is my honest opinion that the manager of a certain exchange would welcome honest criticism and afford projectionists full cooperation. But the projectionist at this other theatre does not deem it advisable to submit his complaint without the consent of the manager, thus we have a situation where a projectionist who favors good prints is unable to voice his objection to rotten film solely because he has not the manager's approval. For myself, when the day comes that I must first secure any manager's consent before voicing my objection to poor film, I shall bid the projection room goodby and go back to following a mule on the farm.

This is my first contribution to your paper, and if you can spare enough of your valuable space I would like to have same printed in full, just as is.

The samples submitted by Mr. Reese indicated a print in very bad condition:—sprocket holes ripped on either side for as much as three frames; punch marks; splices of the most faulty construction in profusion; and, last but not least, the film as dry as dust, having buckled often. At

intervals there appears the marks of sprocket teeth which, starting at the side, extend clear to the centre of the frame before the telltale splice appears.

Action on this case was immediate, and it is not unlikely that this particular abuse of film will be stopped or at least considerably lessened.

Metal Splices

From New York City comes the objection of L. J. Carroll, who enclosed samples of films used by him recently. Mr. Carroll reserves comment on the matter, evidently being perfectly content to let the film tell the story. His letter follows:

Enclosed herewith are samples of film used by me yesterday. One look at this film will tell you the story. The film is poor enough in itself, but the addition of metal clips from splices is just another example of the regular run of film around these parts in any theatre after the first runs. And I understand that even the first-runs are not immune to this trouble; some of the boys here having informed me that the only theatres who get good print service are the big Broadway palaces. Well, to me a picture shown in a Bronx theatre must be as much a picture as one shown on Broadway—but evidently some of these big film executives think otherwise.

Metal clips on splices are hardly the discovery of Mr. Carroll, this department having received similar samples from a Burlington, Iowa, first-run some time ago. These splices are made with a clipping punch, but are better adapted for office work than projection.

No less than six complaints have been submitted by the Complaint Department

Local 236—Birmingham

Local 236 at Birmingham, Alabama, is enjoying its best season, and with the approach of the Fall and Winter seasons conditions are expected to be even better.

Working at the Alabama Theatre is a crew of four: J. C. Harper, Frank J. Emerson, Leo Nation and C. L. Gaston. At the Strand is another crew of four: Carl Jones, A. B. Seale, F. E. Walker and R. A. Root, your humble correspondent.

The interest in "talking pictures" is intense in this district, so much so that projectionists are constantly being asked to explain in detail the workings of the various devices.

The writer has been asked so often for information on sound reproduction that he recently contributed to a paper the enclosed clipping. (The clipping describes in detail the operation of the "talkies"). Not only do contributions of this sort awaken interest in the new phase of the picture business, but they serve to emphasize the growing importance of the projectionist—to give a much-needed twist to the idea of many people that a projectionist still stands beside a machine and turns a crank.

It would seem a good idea if Local Secretaries all over the country would offer to contribute to the daily paper a detailed description of sound pictures. It will be good publicity for us projectionists, and, what is more important, it is free.

this month. Many more than six theatres are showing poor film, and this department looks forward to the time when every projectionist in the country will exercise his rightful prerogative to register his objection to poor film.

Stereopticons

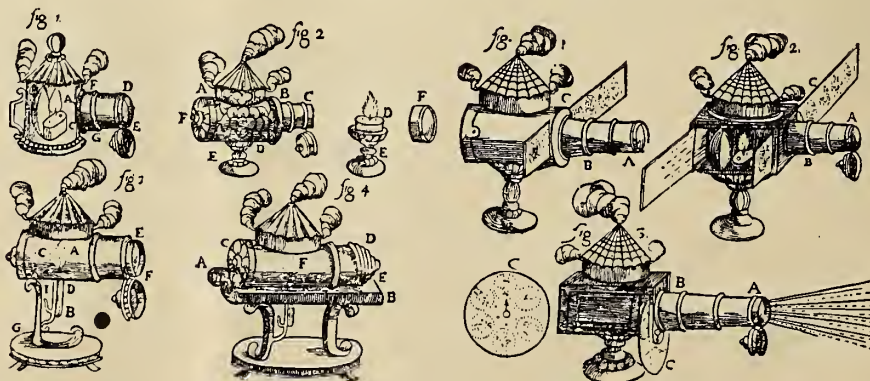
(Continued from page 13)

bring reality into the school for study or take the children out to see reality.

In many Latin writings, between the years 1500 and 1700, we find the projection lantern described as "camera obscura" or

"*Teledioptricus*," published in the year 1685. These crude little devices were forerunners of the modern projection instruments.

The principal difficulty in developing suitable projection apparatus at that time was the utter lack of efficient illuminants. Sunlight was about the only form that was sufficiently bright, and that was impractical. The above sketches from Zahn's



"lantern magica." Who the inventor was seems to be unknown.

Various forms of magic lanterns are shown in Zahn's Latin Book, "*Artificialis*

book suggest that oil lamps were used, and at the right is shown how the machines were constructed to carry a series of slides.

N. Y. State Association to Meet in Rochester

The New York State Association of Projectionists will sponsor a general conference of delegates of member Locals at Rochester, N. Y., on August 27th, the day prior to the opening of the N. Y. State Federation of Labor Convention in the same city.

This will be the second gathering of the Association, an organizing meeting having been held in May. The Association was established to meet the need for a supplement to the purely local union meetings. The Association has the approval of the International Alliance.

All Locals Invited

The conference will be called to order at the Powers Hotel in Rochester at 12 o'clock noon on August 27th. While many locals are already members of the Association, the officers wish to extend to all New York State locals an invitation to be represented at the meeting by a delegate.

Officers of the Association are: President, Paul Graf, Buffalo; Vice-president, George H. Robinson, Niagara Falls; Secretary-Treasurer, Glenn Humphrey, Utica. Executive Board members are the officers and G. Edward Costello, Schenectady, and Hubert Hecox, Ilion. Members of the Legislative Committee are E. T. Stewart, New York City; Albert Ryde, Buffalo, and Secretary Humphrey.

No Professional Kodacolor

Kodacolor, the color process just placed on the amateur market by Eastman Kodak Co., is not adapted to professional use. No method of satisfactorily making a large number of duplicates has as yet been worked out.

Eastman, however, is steadily working on the adaptation of the process to professional use, and high hopes of ultimate success in this direction are held by Eastman executives.

With Talking Equipment
insist on

AUTOMATIC SHUTTER CONTROL

and

3 WIRE CIRCUIT

miniature power house foot switch

For Simplex and Motiograph Projectors

1. A very simple installation requiring only 3 wires for any number of projectors.
2. Operates at Smallest Area of Light Beam.
3. Rugged coils that will not burn out.

Installed by

Roxy, Loew, Keith, Fox, Wilmer & Vincent and Others

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Ask your Dealer or write to

DOWSER MANUFACTURING COMPANY
225 Broadway New York City

How Many of These Can You Answer?

Can you project a picture at an angle without distortion?

What effect does a condenser have on a picture when used with a reflector arc? Do you think that a better picture is projected with a condenser or without (Mirror arcs)?

Explain what importance is attached to accurate curvature and polish of condenser lenses. Is a thick or thin edge the better?

What is the effect of resistance?

What is the principle of operation of mercury arc rectifiers? Does the "bulb" reduce voltage? Is the transformer a step-down or step-up transformer? What voltage do they operate on? How is the amperage increased and decreased?

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Projection Nomenclature

Aperture—The opening through which the light passes between its source and the screen. The film passes vertically at the aperture.

Cement—A chemical solvent used to join two pieces of film together. Ether is one of its active constituents. Film cement evaporates quickly, therefore should be kept in tightly corked containers.

Exchange—A central depository from which film may be bought, rented, or borrowed.

Film Mender—A clamp-like device used to facilitate the splicing of film.

Footage—Refers to length of a roll of film.

Frame (noun)—Refers to a single photograph in the roll of film. There are 16 frames to every foot of standard film.

Frame (verb)—The operation of correctly aligning the picture on the screen. "Framing" is accomplished by moving a lever or some other similar device.

Frame Line—The line that divides the top of one image from the bottom of the other. This line is observed when picture is in misframe on the screen.

Geneva Movement—A form of intermittent movement first used in Geneva, Switzerland; hence the name. It is the form of intermittent movement that is most used.

Intermittent—The device that moves the film normally at 16 frames per second.

Leader—Blank or opaque pieces of film at beginning of the reel placed immediately ahead of the title. It is placed there to facilitate threading the projector and to protect the first few feet of the title.

Legend—Titles and Subtitles—Words of explanation descriptive of various scenes in the film.

Loop—Slack places left in the film, one immediately above the aperture and another immediately after the intermittent sprocket.

Mazda Equipment—The incandescent lighting unit used in professional projectors. All portable and semi-portable machines are equipped with incandescent lamps. Carbon arcs are used in professional projectors. Where it is necessary to project pictures at great distances carbon arcs are always used. Mazda equipment is coming to be used more and more as time goes on, for shorter projection distances.

Misframe—Caused by an improperly spliced film, or incorrect threading of projector.

Operator—The individual who manipulates the projection apparatus.

Perforations—Sometimes called sprocket holes—on both edges of the film. In standard film there are 64 perforations on each edge, per foot.

Positive Print—Film exposed to light behind a negative. The positive is used in the projector.

THE accompanying article on projection nomenclature was published in the first issue of THE MOTION PICTURE PROJECTIONIST and is again published in deference to several thousand of our present subscribers who did not receive the October number, as well as to supply a demand for it by a steadily increasing number of our correspondents. Additions or corrections to this listing will be welcome.

Patch—See Splice.

Projector—An apparatus provided with the necessary devices for showing pictures on a screen.

Projectionist—A skilled operator of motion picture apparatus—an expert.

Rain Streak—Tiny scarlet in the emulsion that soon accumulate dirt. Caused by dirty projector or "pulling down" film.

Reel—The spool upon which film is wound. Sometimes the term reel refers to the film itself as well as the spool upon which it is wound.

Rewind (noun)—A device used to change film from one spool to another either for the purpose of inspection or to make it ready for the next exhibition.

Rewind (verb)—To change film from one reel to another.

Screen—A surface upon which the picture is projected.

Safety Shutter—Sometimes called fire shutter. The safety shutter is located between the film and the light source and opens or closes at the aperture automatically when the machine starts or stops.

Shutter (Revolving)—The device used to intercept the light during the time the film is in motion at the aperture. The shutter also serves to minimize the flicker on the screen by increasing the oscillations of light and shade to such a frequency that the eye cannot detect them. Two-blade and three-blade shutters are in general use.

Splice—A place where two pieces of film have been joined by use of film cement. Such a union is sometimes called a patch.

Sprocket Wheels—The revolving toothed wheels that engage the perforations and thereby move the film through the projector. There are usually three such sprockets; one found immediately after the film leaves the reel; the intermittent sprocket which jerks the film sixteen times per foot between the loops and the lower or take-up sprocket from which the film passes directly into the take-up reel.

Take-Up—The device used to wind the film as it passes through the projector.

Tension Shoes—Found on either side of the aperture. They hold the film gently yet firmly against the aperture.

Throw—Distance from screen to the projector.

Trailer—Blank or opaque pieces of film at the end of the reel. This is placed there as a protection against damage to the valuable film in the reel.

Travel Ghost—The peculiar hazy appearance often seen in a motion picture. It is produced by the improper setting of the revolving shutter.

Lens Definitions

Axis, Principal—A straight line drawn through the centers of curvature of a lens or in case of a lens having one curved and one plane face, it is a line through the center of curvature of the one face, and perpendicular to, and through the center of the other face.

Center of Curvature—Since a lens is made up of the intersection of two spheres, or of one sphere and one plane, the center of curvature of the lens may be considered as the center of the sphere of which its face is a part.

Condensers—The lens combination which deflects the divergent rays of the luminant into the objective.

Focus, Equivalent—The equivalent focus of a plurality of lenses in combination is the focal length of a simple thin lens which will, under all conditions, form an image having the same magnification as will the given lens combination.

Focal Length—The distance from the

center of the lens to the principal focus is called the focal length.

Focus, Principal—The principal focus of a lens is the point on the principal axis at which rays parallel to the principal axis come to a focus.

Lens—A lens may be defined as a piece of glass, or other transparent substance, having two curved surfaces or one curved and one plane surface.

Objective—The picture-forming member (lens) of the optical system. This is sometimes called the projection lens.

Projection Lens—Properly called projection objective.

Projection Distance—The distance between the objective and the screen of a stereopticon or motion picture projector.

Working Distance—The distance from the slide or film in a system to the nearest lens of the objective.

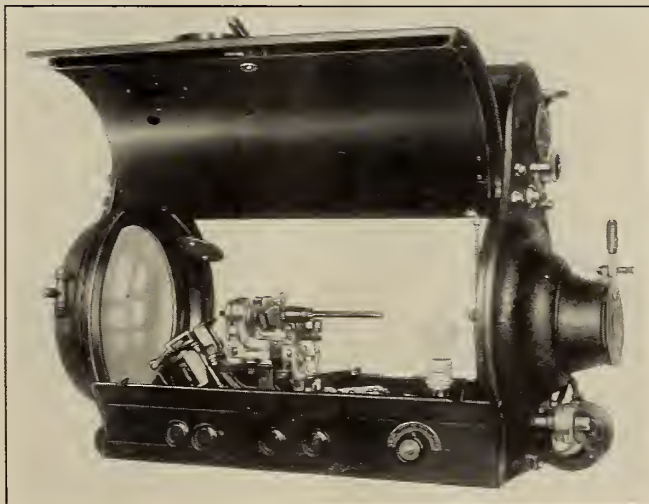
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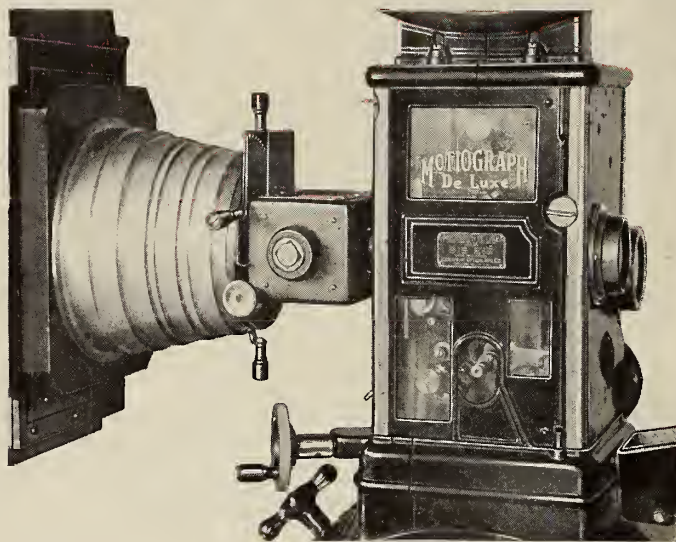
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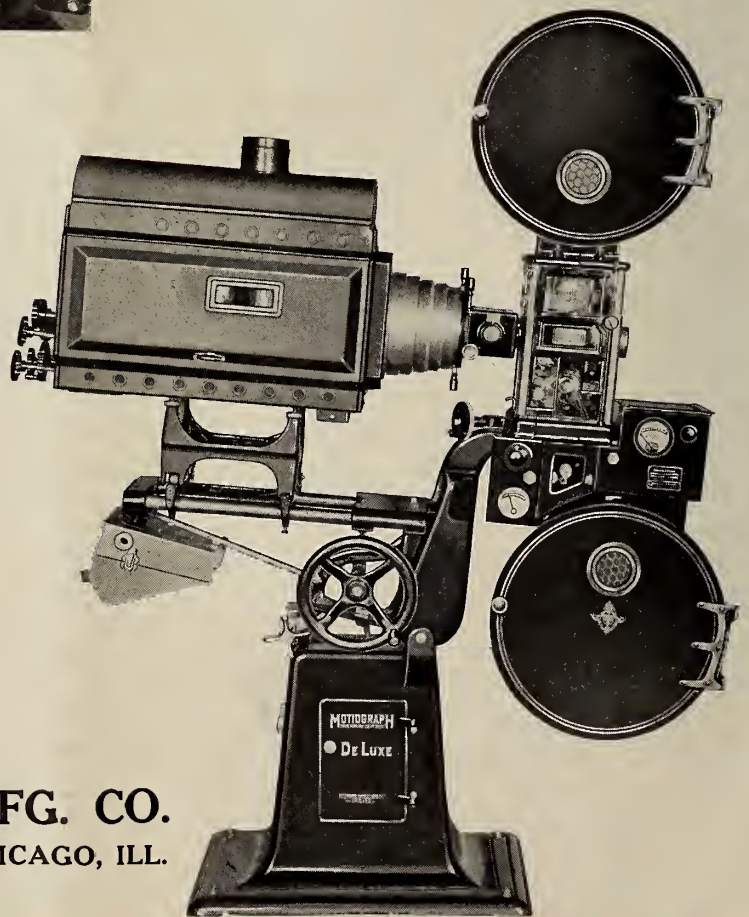


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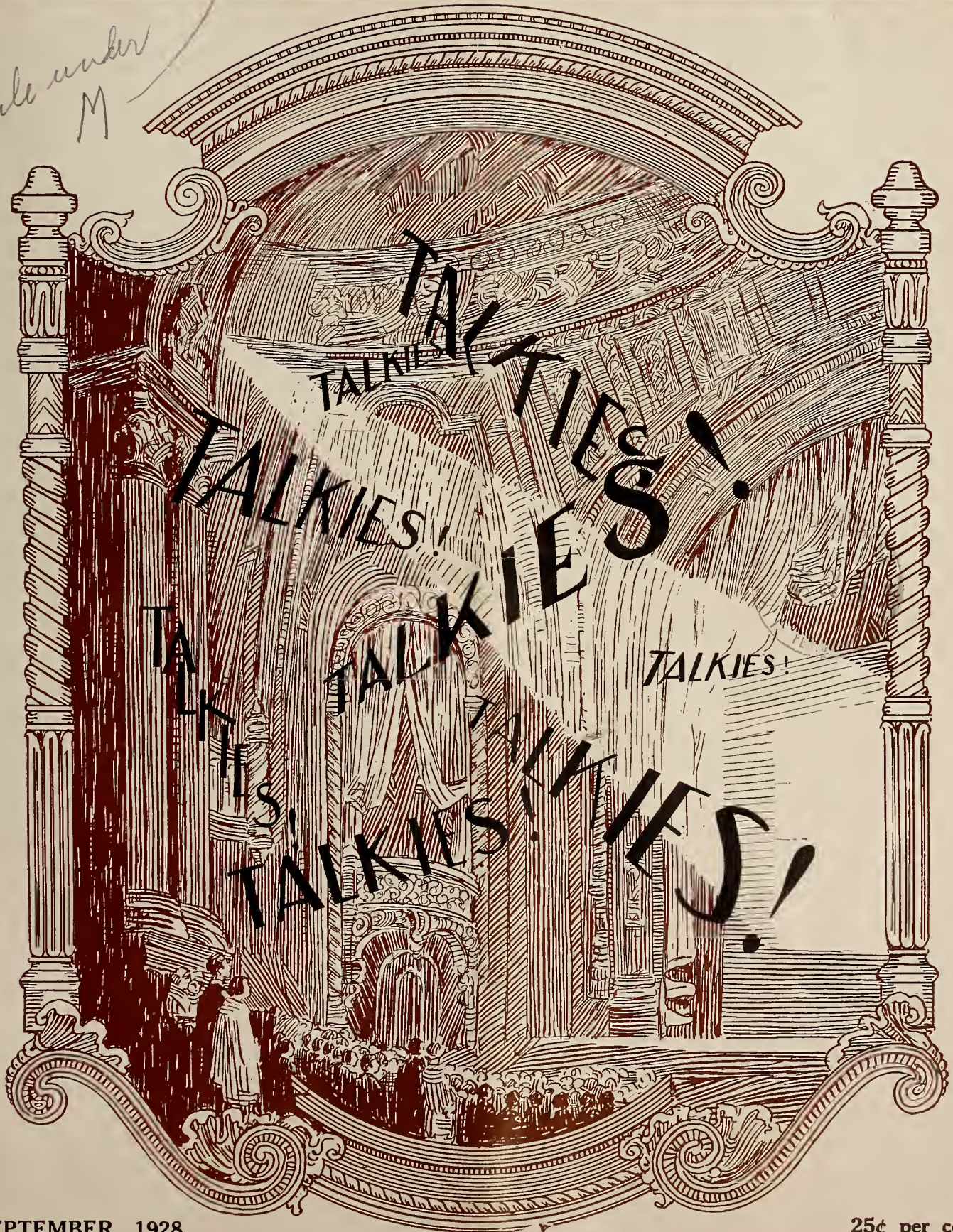


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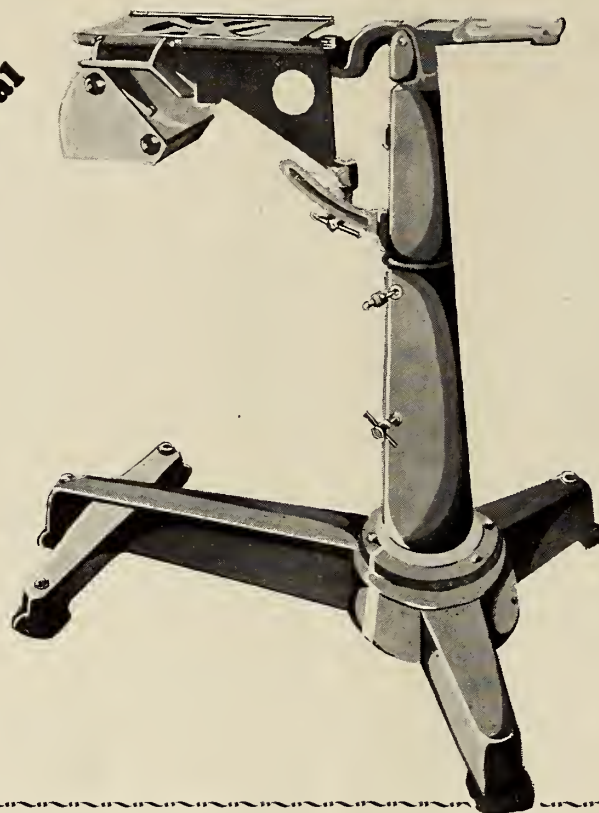
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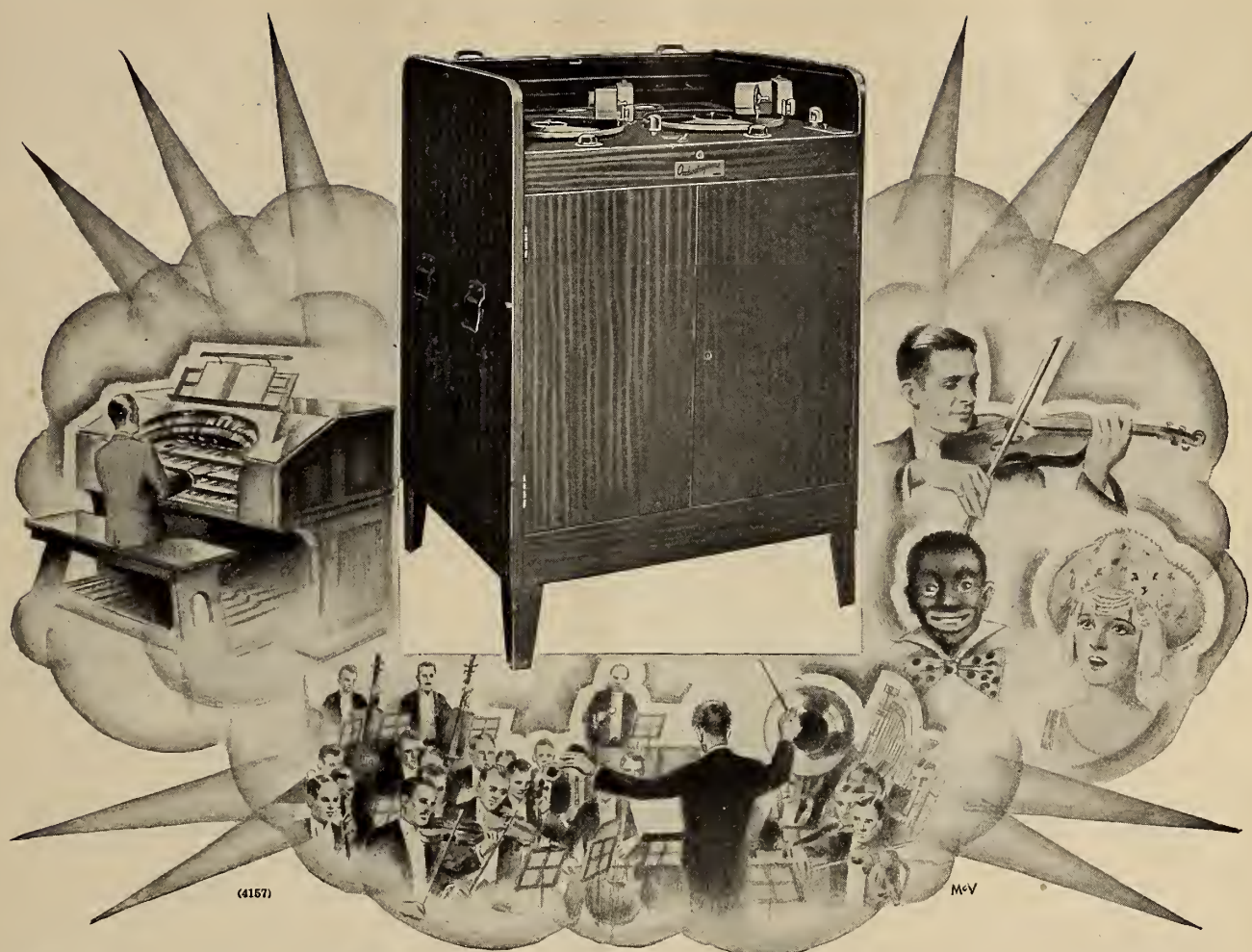


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Bausch & Lomb Observe 75th Anniversary

THE Bausch & Lomb Optical Company, Rochester, N. Y., is celebrating its 75th Anniversary. Appropriate observation of this event is being made by the company which was founded seventy-five years ago on little more than sheer courage but which today has achieved by the excellence of its products unrivalled leadership in manufacturing fine optical products.

The seventy-five years of the history of the Bausch & Lomb Optical Co. have covered practically the life history of the optical industry in America.

This company has put microscopes in the hands of the medical student of today that would have been beyond the imagination of the savant of seventy-five years ago. It has popularized the anastigmatic photographic lens to such an extent that practically nothing else is made except for the cheapest of hand cameras.

It has developed the old magic lantern from a toy to an indispensable scientific and pedagogic tool so thoroughly that the trade name, Balopticon, has been adopted by dictionaries as a common name for any projection lantern. It has been a vital factor, though very often a silent one, in the scientific progress of the nation, in the development, for example, of such wonders as the motion pictures, the motion picture with synchronized sound record, telegraphic transmission of pictures, and television.

In short, the history of the Bausch & Lomb Optical Co. has been the history of the development of the optical industry in this country, and their success is attributable to the high quality they have maintained in all their products.

7 New "Talkie" Cos. Formed Within Month

Seven new companies which will engage in the talking picture business have been formed within the past month, according to reports within the industry. Details of the various companies are lacking, with only their names being available.

These companies are the General Talking Pictures Corp., the Micro Disc Corp., National Talking Movies Corp., American Sound Film Productions, Tonefilm Corp., Biophone Disc Pictures Corp., while the Progressive Film Corp. of Delaware has been formed to acquire and lease recording devices.

Just how these companies will effect distribution of their products is unknown.

New 50,000-Watt Lamp

Quite a stir was created recently in Cleveland on the occasion of the first public showing of the new 50,000-watt incandescent lamp constructed by engineers of the National Lamp Works of General Electric Company at Nela Park.

The new lamp is of the gas-filled tungsten-filament type, with a tall chimney-like extension of the bulb on which is mounted a number of radiating disks, used to dissipate the large amount of heat generated by the filament.

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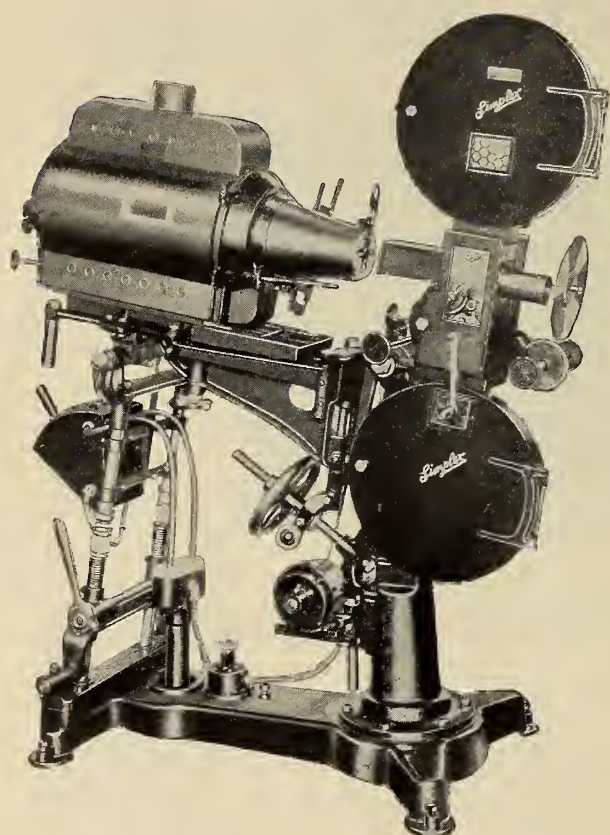
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Light Sensitive Cells

BY SAMUEL WEIN

THE light sensitive devices used in reproducing talking films is the cornerstone upon which true electrical reproduction of sound is based. With amazing rapidity this creature of the laboratory has become the fountain head of a new industry and has transformed the world of motion pictures into a world of living creatures.

With his usual adaptability, the projectionist has been quick to make the photo-sensitive device the tool of his trade, even though lacking a really fundamental appreciation of its functioning or its chemistry.

If this art follows the usual course of all its predecessors, the practical users in public service will contribute significantly to its progress. It is therefore in order that the progressive projectionist acquaint himself with the fundamentals at least of light sensitive cells.

I will not lead into a historical survey of the literature on the subject (which I trust I shall have the opportunity of doing at a later date), but I will tell the *how* and *why* of a light sensitive cell.

Three Known Types

There are three known types of light sensitive cells, which are classified as follows: (1) photo electric, (2) actino electric, and (3) photo voltaic. Until recently, all of the textbooks and the contributors to the science of light action on the metals were accustomed to call any electrical effect as the result of light a "photo electric effect."

Any electrical change in an element, compound or substance resulting from light exposure thereon, was termed a photo-electric effect.

In the last few years the literature be-



Samuel Wein

SAMUEL WEIN, author of the accompanying article, has been active as a light physicist for more than twenty-five years, covering almost the entire range of the development of such modern sciences as radio, television and sound pictures. Mr. Wein has a library on sound pictures which is acknowledged to be the finest in the world. Many papers in this collection antedate 1900 and have been obtained from countries all over the world.

Mr. Wein is the inventor and developer of the liquid tube (photo-voltaic cell) described in the August issue. At present he is carrying on extensive experiments in the radio and television fields, as well as acting as counsellor on sound picture production for various producers. Other interesting articles by Mr. Wein, as well as rare photographs from his collection, will appear in these columns from time to time.

came so abundant and replete with the various types and kinds of cells and compounds that would change in its electrical characteristics with light exposure, that it became a science by itself. As a typical illustration, the writer has been identified with this science for twenty-six years, and during this period he has collected some 50,000 references relating to the different types of light sensitive cells, including the elements, compounds, and the diverse applications thereof.

The distinctions among these three types of light sensitive devices are basic and significant, and are thoroughly worth understanding.

The Photo-electric Effect

The Photo-electric Effect: This is a film of an alkali metal deposited on the inside of a highly evacuated glass bulb, into which has been sealed two electrodes. One of the electrodes is termed the *cathode*, and consists of a film of the alkali metal or the corresponding hydride, to which we will refer later on; the other is termed the *anode*, better known as the collector.

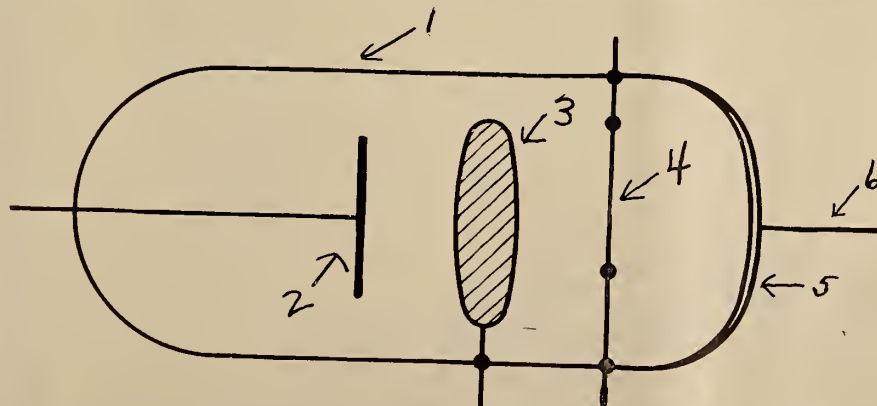
If we connect a source of direct current in series with the cell and a meter—the cathode being connected with the negative terminal of the source of the current, and the collector with the positive terminal of the source of the current—on exposing the cell to a source of light, the current flows through the circuit and gives a reading on the meter. The meter reading is directly proportional to the source of light it is exposed to.

Immediately the light source is shut off, the current flow through the circuit will cease to flow as well. In fact, relationship between the light exposure and the current flow with respect to time is so fast that it will follow almost any speed, or rapidity of change, and can be used for any practical or laboratory purpose.

We can secure a flow of electrons between the cathode and anode much in the same fashion as with a radio tube. In the radio tube the electron flow is set up only when the filament is connected to a source of current. In the photo electric cell a current flow occurs only on exposing the cell to a source of light, whether the cell is connected to a source of current or not.

Actino-electric Effect

The Actino-electric Effect: Various special materials of a high electrical resistance give rise to the actino electric effect. When such materials are connected in series with a source of current and a meter and are exposed to a source of light, the



Analytical diagram of P. E. cell. 1. Glass bulb. 2. Collector. 3. Grid control. 4. Filament for bombarding. 5. Light sensitive element. 6. Electrode to circuit.

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resistance of the material changes with the light.

An illustration of varying resistance is the well-known resistance box which is commonly used with motors. Its resistance is increased or decreased by cutting off more or less of the resistance coils in the box by passing the control switch over a multiplicity of contacts connected with the resistance coils. As the resistance is varied we may increase or decrease the speed of a motor.

The same phenomena on an entirely different scale is found with the actino electric effect, the resistance of the material involved changing with the light reflected upon it. It might be said for completeness sake that the currents dealt with in actino electric cells are very small indeed, and cannot be made to directly increase or decrease the speed of motors.

Photo-voltaic Effect

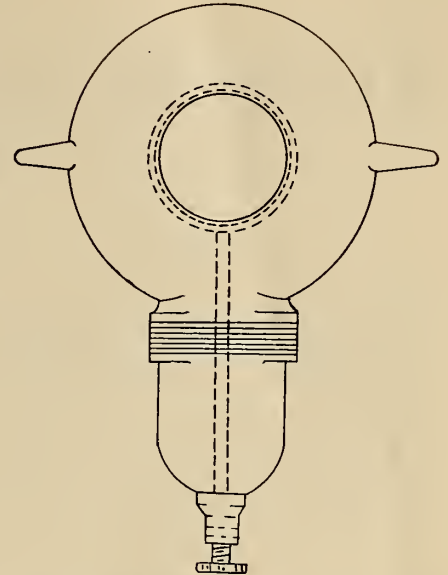
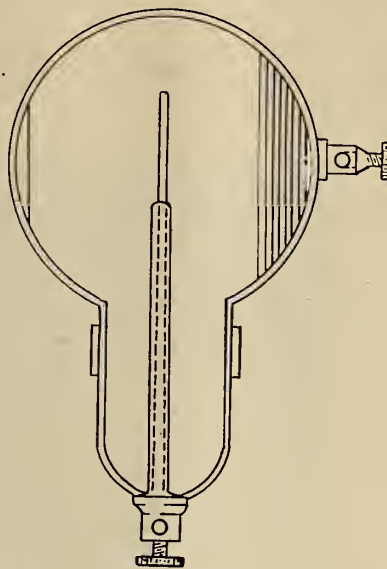
The Photo-voltaic Effect: Here we have two metals inserted in a solution (electrolyte). A potential is generated on exposing one of the elements or the electrolyte to a light source. It is virtually a light sensitive battery in its most elementary form.

This article will be devoted exclusively to the photo electric cell.

The technical literature shows various types and kinds of photo electric cells, but the forms of cells are not important to the facts given here. The reason for the different forms of cell construction is because of the different conditions that the manufacturers of cells work under. However, the shapes of the various cells play no part in their physical characteristics.

The qualities of the glassware used in the construction of cells are in regard to (1) the resistance to chemical corrosion, (2) dielectric capacity, (3) light transmission characteristics, and (4) the ease of mechanical working.

As to the first point, it is desirable that the material will resist contamination by the active metal deposited on its wall; in



Two types of commonly used photo-electric cells

other words, no chemical reaction must take place between the glass and the metal deposited thereon. By dielectric capacity, we refer to a glass having a high electrical resistance, thus eliminating to a great extent "current leakage" across the terminals.

Materials Employed

The absorption of light through the glass must be minimized, especially so for the higher radiations, i. e., from the yellow lines up to the ultra violet lines in the spectrum; therefore, one is able to cover visible and invisible range in the cell sensitivity. And last but not least, the glass must be such as to permit its ease of manufacture.

The materials most frequently employed for the manufacture of photo electric cells are (1) lime, (2) Pyrex, and (3) quartz. The last named glass is by far the most difficult to work with, requiring a much hotter flame by the glass-blower. Another fact is that it requires platinum contacts sealed through the glass for contacts. It must be said, however, that it is by far the best kind of glass for photo electric cells, since it permits most of the actinic light to pass through it. Quartz is quite expensive.

Pyrex is less difficult to work with, and accordingly is used extensively for commercial P.E. cells. A less hot flame is employed for Pyrex than for quartz glass, and special kinds of sealing-in wires are used as contacts, such as tungsten, etc. Lime glass is used extensively for commercial forms of P.E. cells. In this glass we use "copper-clad" wires for sealing in. The light transmission value of lime glass is lower than that of Pyrex, but it is readily worked in glass-blowing machines and hence is used extensively.

Photo-electric Cell Construction

The lead wires are first fused through the glass selected and serve as the electrodes in the cell proper. The cell is then connected into a high vacuum system usually consisting of a mercury "aspirator"

and an oil pump, both working in tandem. To this vacuum system is connected means for absorbing vapors generated by the oil and mercury vapor pumps.

Simultaneously with the evacuation of the bulb proper, a "degassification process" to dispose of the gases that might be in the glass and in the metal parts of the embryo cell is carried on. This process is accomplished by heating the bulb in a closed hot chamber and the metal parts by means of an "induction furnace." In this manner is secured what is termed a "hard vacuum."

The next step is to make a conducting surface on the inside of the glass bulb. The common practice is to precipitate a film of silver on the glass, much in the same fashion as is done in mirror making. In recent years this method has been dispensed with since the silver film oxidizes readily under the process of degassification.

Depositing Active Materials

The modern practice is to deposit a film of magnesium on the inside of the glass tube. This is usually done by "exploding" the magnesium in the evacuated bulb, following the same procedure of radio tube manufacture.

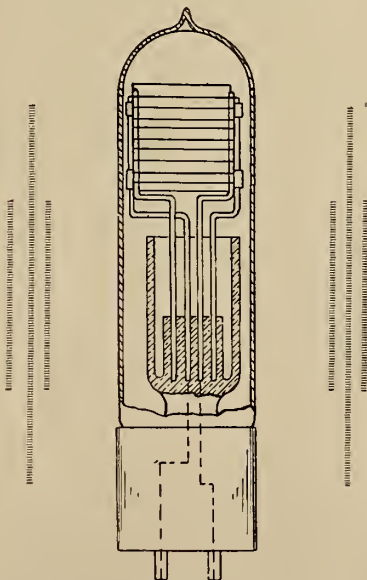
Onto the film of silver or magnesium is deposited a thin film of any of the following metals, listed according to their sensitivity: lithium, sodium, potassium, rubidium, and caesium. Other metals and alloys of metals may be used, but the foregoing are most sensitive.

After the coating of the metal has been successfully carried out, the cell is sealed off and allowed to age for several days before it is used.

Hyper-sensitizing

For some special purposes, when cells that will respond to weaker light sources are required, special processes are used to increase the sensitivity of the deposited metal to light. This is usually done after the metal has been deposited by permitting dry hydrogen to flow through the tube and

(Continued on page 25)



The Wein cell. Light sensitive material is deposited on a nickel plate, instead of the glass wall, as heretofore.

Just What May We Expect of Television?

By AUSTIN C. LESCARBOURA,

Member I. R. E., Member A. I. E. E.

TELEVISION, the latest child of science, is a subject of much discussion these days. There is a veritable flood of loose talk regarding television. Columns upon columns of loose writing are appearing on the subject. Special publications are dedicated to television. Radio manufacturers are offering television parts and kits—with complete outfits just around the corner. Certain silvery tongued gentlemen are soon to employ television as the figurative crowbar in prying hard-earned savings from inexperienced and gullible investors. Radio dealers are featuring what purports to be television to gaping crowds. In short, the day of television has arrived.

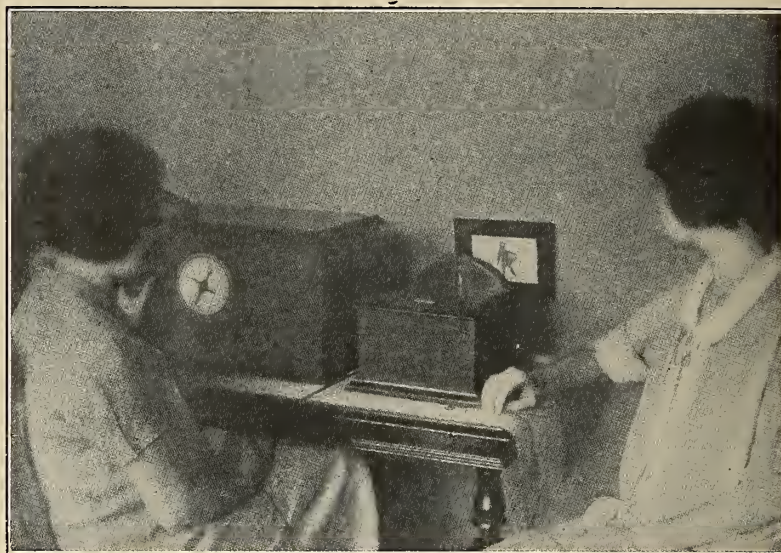
What is it all about? Well, no one knows for certain. One guess is as good as the next. Television in all probability will develop as did broadcasting—from an experiment to an industry and public institution—if given time and proper support. Then again, foolish handling may kill it in the infancy stage. Nevertheless, let us sit down at this time and analyze this television subject so that we may know, as electricians, how to discuss it intelligently when called upon for an opinion.

Principles Not New

First of all, let us get this fact straight: television, as it is now being done, is nothing new. The principles go back several decades. However, it has remained for the precise technique of modern radio to make the old television idea at least workable. Sensitive photoelectric cells or electric eyes, remarkable amplifiers or electrical microscopes, and neon glow lamps which react to the slightest current variation in terms of luminosity—these factors are quite new and provide the necessary precision tools for the television worker.

Despite these precision tools, however, television technique is really quite crude. Indeed, it is doubtful whether we shall ever get very far in our present basic system, and experts are generally agreed that we shall have to stumble across something entirely different. Even so, the same thing might have been said about the radio telephone in its laboratory days.

The basis for the present radio tele-



Receiving Silhouette Images on Home Set

IN connection with this article, the following comment by Dr. Lee De Forest is interesting: "Within the next few years radio fans will derive much interest and amusement from receiving small, poorly illuminated coarse-grained unclear silhouette and halftone effects."

"All this talk about motion pictures by radio in the home and color by television is the veriest bunk; and in the interest of fact, common sense and on behalf of the theatre owners and sincere purveyors of motion picture entertainment, some of whom are actually panicky concerning the future, such dreams should be conscientiously discouraged."

"Real television will sometime arrive, but will always be much more satisfactory over the wire than by radio. The full development of the science will be a matter of ten years or more."

vision system is the point-by-point analysis of the subject, assigning a relative light value to each point, transmitting those light values to the distant receiver, and reproducing those various light values in the proper order and position so as to produce a pattern that provides an approximation of the original subject.

Transmitting Process

At the transmitting end, we have first of all a powerful source of light, in front of which is a revolving, slotted disk or scanning disk, serving to throw a narrow beam of light on the subject. The scanning disk is so arranged that it sweeps a beam of light across the subject, line by line, in a fraction of a second. Meanwhile, facing the subject, is a battery of sensitive photoelectric cells, ready to respond to any light which reaches them. The only light is that reflected by the subject as the result of the sweeping beam, since the subject is in a darkened room. Hence the

photoelectric cells receive a light value for each point explored, and accordingly modulate the outgoing radio wave.

Recently a simple change in the arrangements has permitted of handling subjects in broad daylight. In this case the subject is uniformly illuminated, so that we cannot employ the exploring light beam and the reflected light idea. Instead, we depend on the scanning disk to give us the point to point examination of the subject by the photoelectric cell placed behind the scanning disk and optical system. In this manner the photo-electric cell receives a light value for each portion of the subject.

Reception Process

The receiving end is just the reverse process. We have a source of light, such as the neon glow tube, the luminosity of which is accurately controlled by the modulation of the incoming signal. In fact, the neon tube, connected to the output of the usual power amplifier in place of the loud-speaker, gives us a *visual* instead of *oral* interpretation of the signal. The neon tube is giving us the point by point analysis of the subject at the distant transmitting studio. All that remains is to arrange these various luminous values in some sort of pattern corresponding with that at the transmitting studio, and this is done by means of a scanning disk which "positions" the varying light from the neon lamp into a definite order on the screen, weaving an approximation of the original subject.

It takes an age to tell this story, in comparison with the actual operation. In fact, television takes place in a fraction of second. The entire image must be painted with light in less than 1/16th second. The image, of course, is an optical illusion. If we could see rapidly enough, at any given instant we would have but a single point of light on the screen before us. However, due to persistence of vision, the eye retains all the dots thrown on the

(Continued on page 22)

Use of Tachometers*

BY NICHOLAS M. TRAPNELL

SPEED indicators, when first used on projectors in motion picture theatres, were considered a luxury, and were only found in a few of the best first-run houses. The advantages to be gained by the use of accurate speed indicators, or tachometers, soon became apparent, however, and today the projectors in nearly every first-run house are equipped with them.

It is only by the use of tachometers that the modern theater is able to maintain an exact schedule, that the projectionist is able to run his projector at a definite, constant speed which will give the best results on the screen, and that the orchestra leader is able to correctly time his score; but it is not only on projectors that tachometers have made possible improvements in technique which would otherwise have been impossible.

Tachometers are now in general use, or are coming into general use, in other phases of motion picture production and exploitation, such as on cameras, where the importance of a standardized constant taking speed has long been recognized and insisted upon; on film developing and printing machine and where this time must be varied with changes in the strength of the solutions; and more recently, in the two systems of "talking motion pictures," the Vitaphone and Movietone, where the sound recording device must be perfectly synchronized with the camera.

Tachometer a Necessity

There are probably other phases of the motion picture industry where tachometers are now considered a luxury but where they will soon become a necessity, also there are probably phases where tachometers are not used at present, but where much could be gained by using them. My object is to discuss present uses of tachometers and to get suggestions and information on new applications of the tachometer in the motion picture field.

There are certain general conditions which must be met by the tachometer manufacturer in nearly all applications of tachometers to motion picture work, and they may be briefly described as follows:

The tachometer must be light and compact. This is especially important on all portable equipment, such as cameras, where any increase in weight or bulk is undesirable.

It must require only a very small amount of power to drive it, because on most motion picture equipment there is very little surplus power available for driving the tachometer. This is true on motor-driven as well as hand-driven equipment, since the size of the motors is usually kept to a minimum.

The accuracy must remain constant and must not be affected by wear of the me-

chanical parts. A tachometer whose accuracy decreases with increased wear of its parts is worse than useless after a short time in service.

It must be reliable and require practically no attention, because most projectionists and cameramen have not had special training necessary to enable them to make repairs on tachometer equipment, if they had the time.

The tachometer readings must often be transmitted to a point remote from the machine whose speed is being measured, as on projectors or remotely controlled cameras, and it is often necessary to have more than one indicator connected to the same machine, as on projectors in theatres where one indicator is mounted in the projection-room, one in the orchestra pit and sometimes a third in the manager's office. The tachometer equipment should be so designed that this can be done easily and cheaply.

Types of Tachometers

We now come to a consideration of the different types, or classes of tachometer equipment available, and the degree to which they meet the above-mentioned conditions, which is a measure of their suitability for motion picture work.

Tachometers may be divided into four general types or classes, according to the principles on which they operate.

First—The mechanical type, which usually consists of a centrifugal device having a rotating mass whose position is dependent on the speed at which it is rotated and which is mechanically connected to a pointer moving over a scale calibrated in revolutions per minute, or other suitable units.

Second—The hydraulic type, consisting of a small rotary pump which circulates liquid, usually an oil or glycerine, through a closed circuit in which is an orifice of definite diameter. The pressure of the liquid in the circuit between the pump discharge and the orifice is directly proportional to the speed at which the pump is driven and the speed is measured by means of a pressure gauge calibrated in revolutions per minute.

Third—The magnetic drag type, in which a rotating permanent magnet tends to deflect an armature hung on pivots. The deflection of the armature is resisted by a spiral spring and the amount of deflection is proportional to the speed at which the magnet is rotated. The armature carries a scale which indicates the speed of rotation.

Fourth—The electric type, which consists of a small direct-current generator or magneto, driven from the device whose speed is to be measured, generating a voltage directly proportional to its speed, and connected by means of wires to a

voltmeter calibrated to read in revolutions per minute, feet per minute, or other suitable units.

The mechanical type of tachometer, although it can be built in a very light and compact form, is usually far from being accurate in its reading, due to wear of its parts; and it is impossible to transmit its readings to a point remote from the machine whose speed is being measured. In spite of these defects, however, it is used to some extent in motion picture work.

The hydraulic type, on account of its large size and weight, and the large amount of power necessary to drive it, is never used in motion picture work.

The magnetic drag type is very little used in this work because it is usually necessary to drive it by means of a flexible shaft which consumes considerable power, is subject to wear, and adds materially to the weight and inconvenience of portable equipment.

Electric Type Is Ideal

The electric type is by far the most suitable tachometer for most motion picture work. It can be made very light and compact, its accuracy is not affected by wear of its mechanical parts, it requires an extremely small amount of power to drive it, and when properly designed and constructed requires no attention of any kind after installation. Its readings can be easily transmitted to any distance by extending the connecting wires between the magneto and indicator; and as many indicators as desired can be run from the same magneto.

There are now two classes of electric tachometers available for motion picture work. In the older class the magneto generates a very low potential, about eight-tenths of a volt per 1,000 revolutions per minute, has a high internal resistance, about 70 ohms, a low output, and a low resistance in the external circuit, which includes the indicator and connecting leads. This class has several disadvantages. It is subject to error due to changes in resistance of the external circuit which may be caused by faulty electrical contacts or connections, or extreme temperature changes.

Because of the likelihood of error due to resistance changes, the brushes which bear on the commutator of the magneto are made of a soft non-corrosive alloy to prevent corrosion at this contact point, and since this is a poor bearing metal, the brushes soon wear out. The magneto, indicator and connecting leads must all be adjusted and calibrated together and are not interchangeable. The indicators, because of the low output of the magneto, must be very sensitive which makes them delicate and subject to damage due to vibration, etc. This condition is aggra-

(Continued on page 26)

*S. M. P. E. Transactions.

As *The* EDITOR Sees IT

¶ *And Now Television*

NOW it's Television. There is nothing to worry about. It will be a long time before television is a commercial possibility. First, it has to be perfected. Second, it has to be produced cheaply enough to place it within the means of the average buyer. It is still crude, experimental and, at its present stage, very costly. It will take several years before the laboratories release it for general circulation.

It is hard to forecast what effect it will have on the motion picture industry, as a business, when television is finally a commercial achievement. How will it effect the Projectionist? So many factors will ultimately play a part in the merchandising of this new freak of the air, that all prophecies are not worth the paper they are printed on. But one thing is certain: Against television will be arrayed the whole weight of the motion picture industry: exhibitors, producers, distributors, Projectionists, studios, and the whole complicated machinery and personnel of the financial world now back of the motion picture industry as is.

Anything that may tend to keep people away from the theatre, threatens the millions of dollars now invested in theatres, studios, contracts with players, real estate, etc. It strikes at the very roots of the business built up at so great an expense of money, genius, and tireless effort. It threatens the many millions of dollars represented in stock-holdings among all classes of people. It will, therefore, not be readily tolerated.

¶ *Radio and 'Sound' Analogy*

WHEN sound was first introduced, the industry was skeptical about its usefulness, but it at once assumed a belligerent and antagonistic attitude toward it. That was an attitude of defense, until the new element was tried, and perfected, not as enemy, but as an assisting arm of the motion picture industry. As that was proven, it was accepted.

With radio, the industry assumed a similar attitude. It was at first thought it would keep people away from the theatre, particularly on rainy days. Radio was a *real* problem, but fortunately it took its proper place in the home, not as a fulfillment of all desires for entertainment, but much as bridge game does, as a filler-in between the actual urge for a movie. Radio has not affected movie receipts to any considerable degree.

But television offers a real problem. If pictures can be sent through the air and thrown on a screen in your home—feature, comedy, news reel and all—on a set that can be bought at the price of a radio set today, it may mean that thousands or millions of these television sets may be installed in millions of homes and then, *perhaps*, people may stay away from the theatre.

If Now, that small word may be the immovable wall against which television may butt its head and break its back as a commercial product.

¶ *The Question of Product*

WHO will make the pictures for television films? Will they transmit film made professionally for theatres or will they act out the stories before the television camera for immediate transmission? If the former, what film company will be so foolish as to ruin its own business by allowing its films to be televised? If the latter, where will they get the players now under contract to the film companies for years, the players the public loves and wants to see, to act before their televisor?

The problem of the 16 mm. film was somewhat similar in its final application to the public. There are literally hundreds of thousands of amateur motion picture cameras and projectors now in use and there are complete libraries of 16 mm. feature film. Yet, amateur motion picture activities have made hardly a dent in the tough armor of the motion picture business. In its best form—and this is true also of television in its best form—it cannot compare with the luxury of a soft seat in a modern movie house, the organ and orchestral music where it is provided, the sound orchestration in others, and the pleasure of looking, in complete relaxation, at a large screen with life-size figures moving across it, with light and shadow playing in and out in the most artistic and realistic manner.

¶ *Movies' Superior Quality*

NOR can these compare with the industry in the quality of the productions which it shows nightly in the theatres from coast to coast. It will be a long, long time before anything, not formally presented in a professional moving picture theatre, can compare with those vast panoramic photoplays of moving drama and comedy, produced on a large and lavish scale and presented with the equipment of a modern projection room.

Television is a splendid thing for the imagination to feed on. As a laboratory achievement it tantalizes and prods the mind to visualize the more wonderful things still unknown but sure to come. But as a commercial product—it is so far off as to defy any classification and to mock any prophecy.

So why worry?

Boone Manneall

Storage Batteries and Charging Circuits

BY NAT H. HEWITT
Local 306

LET us first consider the general construction and action of a storage battery. It is not really electricity which is stored up in a storage cell, but the flow of current from a direct current dynamo through the cell from plate to plate performs a certain amount of chemical work. Whenever required, this stored-up chemical energy can be released in the form of an electric current which will pass from plate to plate through an external circuit.

The common type of lead cell comprises a set of prepared lead plates immersed in a dilute solution of sulphuric acid, but a certain electrochemical process known as *charging* must be gone through in order that the cell may deliver a current of electricity.

There are two general methods by which the lead plates for a storage cell may be prepared: (1) A paste of litharge or oxide of lead mixed with a dilute solution of sulphuric acid may be applied to perforations in a lead grid, and then by means of a current of electricity and a suitable electrolyte the surface of some of these plates may be coated with peroxide of lead, while the remaining plates become simply spongy.

Second, large lead plates may be immersed in a certain electrolyte and connected to the terminals of a dynamo. By repeated charge and discharge some of the plates may be coated with peroxide of lead, while the remaining plates become simply spongy.

Development of Battery

Reviewing the development of the storage battery we find (1) that the earlier types of storage cells comprised two lead plates immersed in a dilute solution of sulphuric acid. The terminals of the plates were connected to a direct current dynamo for a period of several weeks. By repeated charges and discharges the surface of the plates received a coating of so-called active material. (2) Later it was determined that the formation of the plates could be hastened by chemical means prior to the charging process. Thus, the cost of manufacturing the plates was accordingly cheapened. (3) In certain types of present day cells—for instance, the Exide lead cell—the active material is applied to the plates mechanically in the form of a paste.

The Charging Process

In general the charging process of a storage cell is as follows: When two ordinary lead plates or sets of plates are placed in a dilute solution of sulphuric acid of the correct proportion and a di-

rect current of electricity from a dynamo passed from one plate through the solution to the other, the resultant chemical decomposition deposits a coating of peroxide of lead on one plate while the other plate becomes gray and spongy, or porous. When one set of plates is fairly well coated with lead peroxide and the other set becomes spongy, the cell is said to be *charged*. If the terminals of these plates are now joined together by a conductor (the charging generator having been disconnected) a current of electricity will flow from plate to plate.

The plate coated with lead peroxide is known as the *positive* plate of the storage cell, and the other, the *negative* plate. When joined together by a copper conductor, current flows in the external circuit from the positive to the negative plate and the resultant chemical change undoes the work of charging, part of the peroxide of lead of the positive plate and the active material on the negative plate is converted to lead sulphate which covers the surface.

When the plates are fairly well coated with sulphate the cell is said to be *discharged*. In order that current may be drawn from the cell again, the plates must be connected to a source of direct current and the charging process repeated.

The process involved in the charge of storage cells may be better understood from the explanation which follows:

Fundamental Actions

When a lead storage cell is put on discharge, the current is produced by the acid of the solution going into and combining with the porous part of the plate called the *active material*. As stated before, in the positive plate the *active material* is *lead peroxide*, and in the negative plate it is *metallic lead in a spongy form*.

When the sulphuric acid in the solution combines with the lead in the active ma-

terial a compound known as *lead sulphate* is formed.

As the discharge progresses, the solution becomes weaker by the amount of the acid used in the plate which, incidentally, produces the compound of acid and lead called lead sulphate. This sulphate continues to increase in quantity and bulk, thereby filling the pores of the plate. As the pores of the plate become filled with sulphate, the free circulation of acid in the plate is retarded, and since the acid then cannot get into the plate fast enough to maintain the normal action, the battery becomes less active, a condition indicated by a rapid drop in voltage.

During the charging period direct current must pass through the cells in the direction opposite to that of discharge. This current will reverse the action which took place in the cells during the discharge. It will be remembered that during the discharge the acid of the solution went into and combined with the active material, filling its pores with sulphate and causing the solution to become weaker.

Reversing the current through the sulphate in the plate restores the active material to its original condition and returns the acid to the solution. Thus, during charge, the solution gradually becomes stronger as the sulphate in the plate decreases, until no more sulphate remains and all the acid has been returned to the solution, when it will be of the same strength as before the discharge, and the same acid will be ready to be used over again during the next discharge.

Since there is no loss of acid by this process, none should ever be added to the solution.

The whole object of charging, therefore, is to drive from the plates the acid which is now absorbed by them during discharge.

The liquid in a storage cell is known
(Continued on page 21)

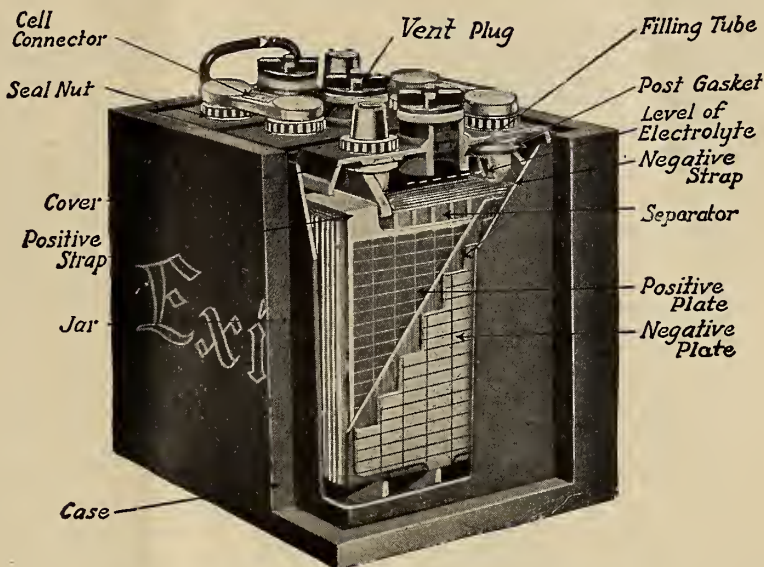


Fig. 1.—Sectional view of battery, showing construction

Replacements for W. E. Equipment

BY ELECTRICAL RESEARCH PRODUCTS ENGINEERING STAFF

THIS article will cover the principal replacements and repairs required on the equipment. Any worn out or defective part of the equipment must be replaced only by the spare or replacement part furnished or recommended by us for that purpose. Order replacements by the names used in this bulletin; this will save much time and confusion.

The attention of projectionists is directed to the following clauses of our standard contract with theatres:

"2. The Exhibitor agrees that it will use and employ the Equipment only in the Theatre, and that it will at all times during the period of this license keep, maintain and operate the Equipment in the manner from time to time prescribed by Products and in no other manner.

... Therefore, in order to secure and insure the functioning of the Equipment to the satisfaction of the parties hereto, the Exhibitor shall not, without the written consent of Products move, alter, change or modify the Equipment, nor add anything thereto nor take anything therefrom; nor break the seal upon any part or collection of parts which is or may be sealed by Products; nor operate, use or employ the Equipment in any manner in conjunction with any record of sound or with any other device or combination of devices in any way related to the production or reproduction of sound, unless said records, devices and combinations of devices (other than those made under license from Products for such use) shall have been first tested by Products and found by it to operate properly, reliably and efficiently and to reproduce sound with accuracy of quality and adequacy of volume, and approved by the legal counsel of Products as to freedom from infringement of patents. Also, in order further to secure proper functioning of the equipment as aforesaid satisfactorily to the parties hereto, it is agreed that all additional and renewal parts and assembled parts for said Equipment shall be obtained from Products."

General Instructions

In accordance with this, while projectionists are expected to follow the instructions previously given for dealing with equipment troubles and to do simple repair work on the apparatus,—such as soldering broken connections, replacing burnt-out tubes or burnt-out fuses, tightening loose parts supplied or recommended for the purpose by us, etc.—it is *expressly forbidden to experiment* with the equipment by changing circuits or substituting coils, condensers, etc., of other

types, or by using records of types not authorized by us, as this might result in a situation constituting default of contract.

Tubes that have once been used in a rectifier are unfit for use in amplifiers, as they are incapable of giving good quality. Therefore, be sure to exercise care on this point in handling the stock of spare vacuum tubes.

Changing Receivers

If a defective receiver is found by application of the various tests described in these instructions, replace it by one of the spares furnished by ERP. Be sure to connect each wire to the same terminal on the new receiver as it was connected to on the old one. All four receiver terminals are marked for this purpose. If a receiver is connected wrongly the quality of the sound as heard in the house will be spoiled.

Never open receivers nor attempt to repair them. Never operate a receiver without the horn, as this may damage it.

In installations having only one horn, if this horn is provided with a receiver switching device the spare receiver may be put in use by simply moving over the throat lever. The double-throw switch located in the stage cut-out box, which controls the sound circuit to the receivers, must also be thrown to the other position so as to connect in the spare receiver.

Changing Reproducers

If a defective reproducer is found by application of the various tests described in these instructions, replace it by one of the spares we furnish.

The base of the reproducer assembly (swivel, arm and reproducer unit) fits on a bracket attached to the turntable pedestal. This base is clamped to the bracket by means of a milled thumbscrew. When this thumbscrew is loosened and the output leads disconnected from the connecting block, the whole reproducer assembly can be removed. The simplicity of this operation makes it the best method of changing reproducers quickly.

To change a 4-A reproducer unit, remove the two screws attaching the unit to the arm; you will see one of these screws at each side of the reproducer just behind the head. This leaves the unit loose except for the output leads; turn it over on its back, thereby exposing the terminal block, and remove the leads by loosening the binding screws that attach them to the terminal block. To put in a new 4-A Unit, follow these operations in reverse order.

On no account open a 4-A reproducer unit or loosen any screws other than those mentioned, as it is filled with a special damping compound and will be ruined if this leaks out.

Never attempt to repair or adjust reproducers.

Before using a new reproducer during a show, test it by playing a record with it and listening across its terminals with the headset.

Splicing Sound Film

1. Disc Reproduction.

Vitaphone film has 16 frames per foot, and each foot is numbered. Beginning with "0" at the starting mark, the 16th frame after the starting mark is marked No. 1. The 16th frame after No. 1 is marked No. 2, and so on throughout the print. There are, therefore, 15 frames without numbers between each pair of numbers.

By this system, the position of every single frame in the reel is indicated. In synchronized features there are in addition other numbers on the margin of the film which indicate the scene numbers of the picture. These numbers can be distinguished from the footage numbers, because they have a dash at each side, as for instance "—286—", the footage numbers themselves being simply "286," without the dash at either end. In cases where the scene and footage numbers conflict, the footage number is omitted, but is counted, and reference will have to be made to the next footage number in sequence.

If a footage number does not appear at each 16th frame, continue counting until you reach the next number, when you should then have 31 frames between the two footage numbers.

With the numbering system described, it is easy to ascertain whether or not a print has the proper number of frames, by simply examining each splice and counting the footage numbers on each side. The two numbers should be consecutive and there should be 15 frames without numbers between them.

In case of a break in a film, make a patch by inserting black leader. Be sure that the number of frames of black leader inserted is exactly the same as the number of frames you take out of the film, plus the frames used for the patches. After putting in the black leader, be sure to check-up and see that the numbers follow in sequence and that there are exactly 15 frames without numbers between each pair of footage numbers.

If any numbered frames are missing, or if the missing portion is more than 1 foot, you will have to check both sides of the break to the next number, and after making the splice, see that you do not forget the intervening frames.

The procedure for patching sound film has already been explained in detail in these columns.

"For Better Projection—"

IN a recent address on the subject of better projection, P. A. McGuire, advertising manager for the International Projector Corp., made the following interesting comments:

With an extremely limited demand for projectors, we are compelled to manufacture practically one type of mechanism that can be used in the so-called motion picture palace and in the smaller theatres throughout the country. We must design and manufacture projectors that give a clear, steady picture and are dependable under all conditions. The industry demands first—equipment which permits owners to operate their theatres 365 days in the year from early morning until late at night and gives a perfect performance under all conditions.

Perhaps the greatest advance that has been made in motion picture projectors in recent years has been the development of labor-saving devices which give the projectionist more time and more opportunity to control the presentation of the picture, and to that extent are a definite step in the direction of better projection.

These are the practical problems we must meet; and we cannot give too much consideration to ideas which may be of extreme interest from a theoretical standpoint but which cannot be profitably marketed for many years because the industry is not ready to adopt them. . . .

Production Limitations

Although the motion picture industry, as a whole, has grown to tremendous proportions, the manufacture of projectors is still conducted upon a very limited scale. There is a demand for considerably less than 2,500 machines a year, and it will be easily seen that such a low production basis does not permit large scale operation as compared with any other manufacturing lines.

Electricity Predominant in House of Future

The home of the future, as an architect envisages it seventy years from now—about the year 2000—was exhibited, full size, in London recently as a sunbeam house in a land of perpetual sunshine. "Vitaglass," to admit the sun's ultraviolet rays in fair weather, and artificial sunlight for cloudy days and night use, provided a permanent summer-day effect.

A profusion of unusual electrical apparatus, convertible metal and pneumatic furniture, "bunk" rooms instead of bedrooms, laid out somewhat like steamship cabins, movable walls, metal furniture, a garage for a combination airplane-automobile, with folding wings, and on the garage roof a second-story swimming pool, gardens fitted with plants in movable containers so that new floral effects could be worked out at will, rubber tile garden paths, wireless power and program reception masts, and banks of ultraviolet floodlights were among the features of the

Manufacturers of projectors are severely handicapped by low production basis, and this is largely due to the fact that many theatre owners are unwilling to purchase new equipment until absolutely forced to do so. Even in the repairs and replacements, many large theatre owners who are liberal in other ways are extremely economical when it comes to the projection department. . . .

The Projectionist's Importance

One of the greatest mistakes this industry has made is to believe that projection is purely mechanical and to fail to realize that the projectionist must be a highly skilled specialist. No matter how skilled or conscientious a projectionist may be, he cannot be expected to give the best possible results with defective equipment. There are many things responsible for poor projection, but there should be a more general realization that there is seldom any good excuse for inferior screen presentation.

Poor focus,—an unsteady picture,—a flickering image on the screen,—poor illumination,—travel ghost,—film breakage,—improper projection speed—all these things spoil the illusion. The very smallest defect in projection can be responsible for spoiling the effect we have all tried so hard to secure.

For instance: A little dust or oil on the objective lens,—warped film,—the vibration of the projector,—a bent sprocket shaft,—film shrinkage,—imperfect perforations in the film,—unsteady arc,—dirty condensers,—insufficient current,—punch-marked film,—all of these are contributory forces which may result in poor projection and a destroyed illusion.

All these defects are preventable if the theatre owner is willing to take a reasonable interest in the work of the projectionist.

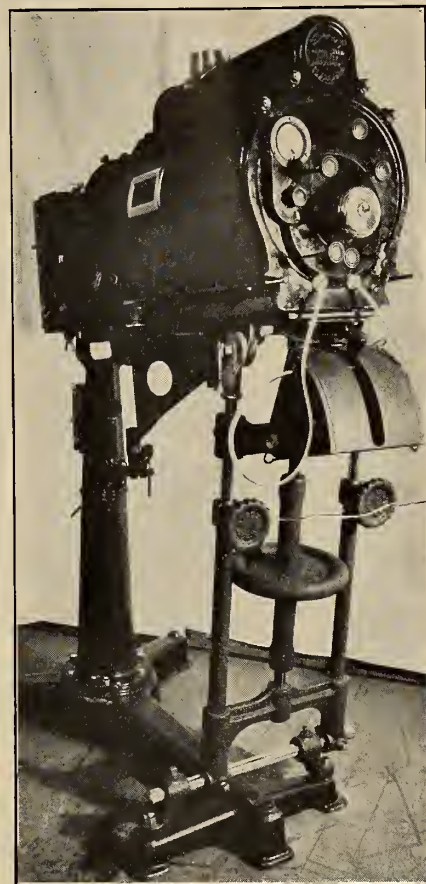
house designed by R. A. Duncan, says *Popular Mechanics Magazine*.

Electricity was predominant everywhere. A sunken garden pool and the fountain feeding it were illuminated by night from under-water lights in many colors. The queer metal beds with pneumatic mattresses were equipped with electric blankets for warmth. The study wall was lined on one side with built-in radio and loud speakers, a built-in television set to see the day's events and a built-in telenews-paper for visible radio projection of the day's events. An electric writer, to transmit by radio similar written messages, and an elaborate lighting control panel also were included.

President Green on Movietone

The Labor Day address of President William Green of the American Federation of Labor was recorded in part by Movietone process, incorporated in a regular issue of their news and shown in all theatres subscribing to this service.

Advertisement



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Complaint Dept.

AMONG the complaints received this month is one which differs from the usual contributions to this department in that it takes to task that class of projectionists who are inclined to be rather careless in their handling of film. While admitting that the exchanges are responsible in large degree for present bad film conditions, this correspondent indicts the projectionist on the score of improper handling of film and attributes to this type of man the blame for a large part of film damage. The letter follows:

Here is another complaint about film conditions.

We all know that the exchanges are more or less responsible for bad splices, etc., but by kick is against these so-called projectionists who mark the final scenes with paper, scratches, punch holes and very often a series of pin holes.

Even though the exchange issues cue sheets, these knights of the film still insist upon using their own private systems. For example, we ran three M-G-M's in three consecutive weeks—one of nine reels and the others both of seven reels—and all were accompanied with cue cards; but despite this, every reel except the last in each picture was cued with four or five big scratches.

The houses I work for are both first-run theatres, but of course the film usually is from two weeks to a month old.

With Sound Film—What?

Apart from the actual damage done to the film, the significant fact about the matter is that eventually those projectionists who use these methods are going to work with sound film, and the chances are that they will find it difficult to overcome these bad habits.

Isn't there some way to put a check on these fellows? I have already suggested to one exchange that their inspectors examine closely the final sequences in each reel and note such marks; after which the theatre manager may be warned that the next similar offence will mean a bill for damages.

It is my idea that a few slaps at their pocketbooks will curb these harmful tendencies of our 1914-model projectionists and cause them to snap out of it and realize that this is the year 1928. I am enclosing a couple of samples which were eliminated from one feature.

R. E. B., Albany, N. Y.

Enclosed in this letter were strips of film totalling 8 feet on the reverse side of which were pasted strips of heavy paper, obviously the work of a projectionist. Charging the exchanges with negligence in caring for film will be embarrassing for projectionists so long as the exchanges are able to produce samples of projectionists' work like this.

With sound pictures these slack methods must be discarded. And the opportunity to do an about-face probably will not be offered the careless projectionist of today, for the sponsors of sound picture devices, no less than the producers and the exhibitors, will not tolerate such abuses. In short, any trifling with sound pictures can have but one result, and that disastrous for the projectionist.

New Television Service to Span Continent

THE method of synchronizing sending and receiving discs used in radio television developed by engineers of the Westinghouse Electric and Manufacturing Company will be one of the main features in apparatus which will be soon put into use by the Radio Corporation of America in transmitting and receiving facsimile messages and pictures between numerous points in the United States.

When arrangements have been completed, the Radio Corporation will be enabled to handle facsimile and picture business between numerous points ranging from Europe to the Far East. The company is already handling the transmission of pictures and facsimile messages between Europe and New York and between San Francisco and Honolulu, and the new apparatus will enable the service to be extended across the United States and the entire way across the Pacific.

Carrier Wave as Synchronizer

The synchronizing system is based on transmitting a constant frequency wave of 5,000 cycles, produced by a tuning fork and transmitted over a special carrier wave. The constant frequency note is received on a special receiver and by means of special apparatus controls the speed of synchronous motors which drive the discs.

This enables the use of the revolving discs in the transmission of pictures or facsimiles, a much speedier process than the old scanning devices used, and mercury arc lamps are used to permit the images transmitted to be thrown on ground glass or screen and there photographed.

It is believed that the apparatus will be ready for use to a number of points before the end of this year. The main circuit will be between New York and San Francisco direct, and other circuits will be provided between New York and San Francisco via Chicago. A further link will connect New York and New Orleans. All the main cities reached will be hooked up with near-by important cities in their section of the United States.

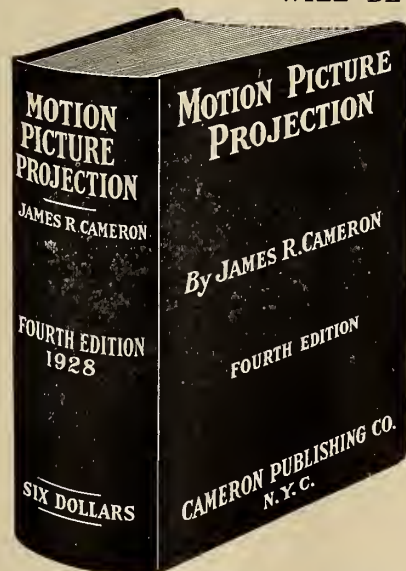
This development follows closely upon the contracts by which the Western Union Telegraph Company and the Postal Telegraph and Cable Corporation among other things obtained the right to use the American Telephone and Telegraph Company's telephoto service throughout the United States, and indicates that there will be keen three-cornered competition for this sort of business.

Wire Transmission Improved

Although telephotography and television are still in their infancy as regards either speed or accuracy, there has to date been practically perfect transmission of pictures by wire by the slower methods and instantaneous transmission by a method which gives hazier pictures. The new Radio Corporation apparatus, developed in co-operation with Westinghouse engineers, is reported to have bridged to some extent these two extremes.

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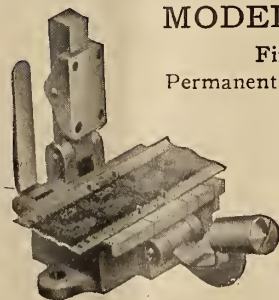
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How a Rotary Brush of Light Paints Pictures Afar*

BY PROFESSOR C. M. JANSKY

IN the preceding article were described the general principles of impressing varying light intensities on an electromagnetic wave. The photoelectric cell is the agent or means by which this is accomplished. It remains yet to explain more in detail how the varying intensities of light can be impressed on the photoelectric cell.

It is obvious that if the whole picture, or lantern slide used for illustration in the preceding article, be interposed between the light source and the cell, the result will be merely one impulse and not a series of impulses which are essential for picture transmission. If the whole picture were interposed, the photoelectric current would be equivalent to the average illumination and so long as the picture did not change, the resulting current would be of constant intensity.

The process or method to be used in the production of fluctuating currents are in principle the same for the transmission of pictures as for television, but as the physiological properties of the eye do not enter in picture transmission the processes of transmission and reception are much simpler than for television, hence radio transmission of pictures will be explained first.

Transmitting Process

The picture to be transmitted is made translucent, much the same as the ordinary film negative. It is then wrapped on a glass cylinder which is rotated by a synchronous motor. A beam of light is focused on the film by a system of lenses and the light passing through the picture enters a photoelectric cell.

The arrangement of these elements is shown in Fig. 1, where L is the lamp; D is a condensing lens; A is a diaphragm; S is a projection lens; C is the rotating cylinder on which the photograph is mounted, and P is the photoelectric cell. As the cylinder is rotated it is moved endwise by a screw. The point of light incident on the translucent photograph describes a spiral or thread of the same pitch as that of the lead screw.

It is obvious that the intensity of light incident on the photoelectric cell will vary as the light and dark parts of the film pass across the pencil. The fluctuating light will cause a fluctuating current in the photoelectric cell which, when amplified, is then used to modulate the carrier electromagnetic wave, explained in earlier articles.

This process of scanning the picture is analogous to the making of a picture by one continuous stroke of the pen. Some years ago there was on the market a pen picture of William B. McKinley. The pen artist began with the tip of the nose and by a spiral and continuous movement produced a very good likeness of the President. The features were delineated by

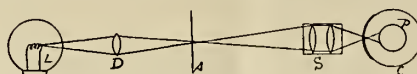


Figure 1

heavy and light lines. Perhaps some of the readers remember seeing such a picture. The pen, of course, takes the place of the pencil of light and the heavy and light ink lines correspond to the more intense and less intense pencil of light as it passes through the translucent photograph.

Picture Made by One Stroke

At the receiving end the picture is reproduced by a pencil of light whose variations in intensity are exact counterparts of those at the sending end.

The modulated electromagnetic waves are received in exactly the same manner as those which are translated into music by the diaphragm of the loud speaker. The translating equipment is again different. In a broadcasting station the sound waves produce fluctuating electric currents which at the receiving station, after being

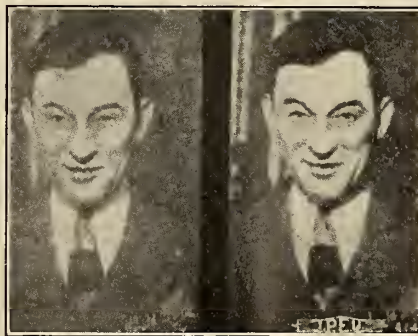


Fig. 2.—Left: The original photo. Right: The radio photo

tial and indispensable element of this apparatus is the neon tube lamp, same in principle but different in form as the many neon tube lamps now used in advertising where the name or word is formed by a amplified, reproduce the sound through the agency of the diaphragm of the loud speaker.

Likewise, in picture transmission varying light intensities, through the agency

of the photoelectric cell, produce varying electric currents which at the receiving end are translated into varying light intensities.

Manner of Reception

The apparatus at the receiving end is simpler than at the transmitting end. It consists of a radio receiver, a rectifier, a neon gas lamp, a revolving cylinder housed in a light tight box, and a synchronous motor geared to the cylinder. The essenglass tube emitting a pink or reddish light.

The lamp consists of a glass tube into the ends of which are sealed two terminals to which a source of voltage is connected. This voltage sends a small electric current through the tube between the electrodes, and this current produces the familiar reddish light. The characteristic of the neon lamp that makes it an essential element of picture transmission is its sensitiveness to voltage variations. The slightest variation of voltage across the terminals is immediately followed by a change in the intensity of light.

The lamp is mounted in front of the lens which focusses its light on the sensitized film mounted on the cylinder in the camera. The signal or electromagnetic waves actuate the radio receiver. They are then carried to a transformer, rectifier and amplifier, and then to the neon lamp. Every fluctuation or change in the electromagnetic wave actuating the receiving set is accompanied by a change in the light emitted by the neon lamp and incident on the sensitized film.

Swiftly Transmitted

As the cylinder rotates, the fluctuating pencil of light traces a screw or helical path on the sensitized film. As the chemical action of light varies with its intensity, it is obvious that the fluctuating pencil will produce more and less intense chemical action. When the film is developed the dark and light portions of the line traced by the pencil of light produce the picture in much the same manner as the penman mentioned above. A picture transmitted by radio is shown in Fig. 2.

The fact that the cylinder at the receiving station must rotate in exact synchronism with the cylinder at the sending station is almost obvious. If it did not, the light and dark lines to form the nose, for example, would not be in proper juxtaposition and the developed picture would show a distorted nose.

The process of transmitting pictures by radio has been improved to such an extent that a picture 4½ by 8 inches can be transmitted in one and one-half minutes.

*Electrical Workers' Journal.

The Job vs. the "Movement"

—A Century of Conflict

THE meeting of the local union has been called to order. Routine business is transacted, and there is introduced a question of policy. An employer has violated a minor clause of the agreement. What is to be done about it? To most of the Brothers it seems a simple matter. The business representative of the local shall call upon the employer, explain the consequences of his act and seek to adjust the matter.

Not so to John Galloper. He rises slowly in his seat, clears his throat, hitches up his trousers, and launches into a long oration on the need of a united front, solidarity, class consciousness and the defence of the movement. To Galloper's excited imagination, this minor point of conflict with the employer—a routine business matter—becomes a colossal incident in the class struggle. It is an occasion for heroics. It is a call to arms. It is a test of every red-blooded member's unionism. So he tests their endurance by a speech of some two hours in length, presuming upon the right of free speech.

In the end the matter is settled in the only way it can be settled, by referring the matter to the business representative. John Galloper sits down in disgust. He is sure the union is going to the dogs, that the officers are all corrupt, and the entire movement is doomed.

The foregoing is not an exaggerated example. Similar incidents occur in virtually every union in America, on every meeting night. They represent a real point of conflict between certain groups within the union—a conflict that has been going on within the labor movement for a century. The conflict may be described as the issue between the "intellectuals" and the "pragmatists" in the labor movement. It is not a fancied conflict. It exists. Every unionist has experienced it, and many have beheld the havoc wrought by the battles precipitated by the "intellectuals."

New Light On Old Conflict

New light is thrown on this century-old contest, there is intensive clarification of the issues, by a book just published by the Macmillan Company, "A Theory of the Labor Movement." This is the work of Selig Perlman, professor of economics, University of Wisconsin. Perlman is an associate of John R. Commons, who has done so much for labor history and labor research in the United States.

We realize that when one is attempting to render judgment on a book soon after he has read it, he is likely to be blinded by his own enthusiasm. But, taking this fact into consideration, we can say calmly that this book, "A Theory of the Labor Movement," is an important book, perhaps a great book, mayhap an epoch-making book. It undermines the shallow philosophy that

has often masked as scientific, and that has on occasion been used as a base for firing broadsides of innuendo against the union. It is in touch with fact. Called a "theory" of the labor movement, it is not so much a theory, or a philosophy, as a succinct reporting of what is now enacting on the industrial field, a clear-eyed summary of industrial conditions, and an intelligent justification of the present policies of the American unions.

Labor Knows What Labor Wants

Perlman draws the issue thus:

"Trade unionism, which is essentially pragmatic, struggles constantly, not only against the employers for an enlarged opportunity measured in income, security and liberty in the shop and industry, but struggles also, whether consciously or unconsciously, actively or merely passively, against the intellectual who would frame its programs and shape its policies. In this struggle by 'organic' labor against dominance by the intellectuals, we perceive a clash of an ideology which holds the concrete workingmen in the center of its vision with a rival ideology which envisages labor merely as an 'abstract mass in the grip of an abstract force.'

"Labor's own 'home grown' ideology is disclosed only through a study of the 'working rules' of labor's own 'institutions.' The trade unions are the institutions of labor today, but much can be learned also from labor's institutions in the past, notably the guilds."

Perlman is cautions of swallowing accepted generalizations of any kind about labor. His is a first-hand study. His method is that of the investigator, not of the propagandist. He was raised as a Marxian socialist, and it is doubly significant, therefore, that he traces the development of labor in Russia, Germany, Great Britain and the United States, a movement sharply diverging from the accepted Marxian theories.

Just What Happens When "Talkies" Don't Talk

When sound apparatus goes wrong it is apt to create havoc with a program. This was evidenced at a New York theatre recently when something went amiss with the sound equipment, and the program of sound subjects had to be clipped from the bill, including *Movietone News*. Giggles and suppressed laughter ran through the house when a sound trailer was shown in which the actor's lips moved without a sound emanating from the screen.

"Even in Russia," he says, "It is an irony of fate that the same revolution which purports to enact into life the Marxian social program should belie the truth of Marx's materialistic interpretation of history, and demonstrate that history is shaped by both economic and non-economic forces." He shows that the ruling classes in Russia failed to manifest a will to power, and shows why the state is strong in Russia under the bolsheviks, simply because it was strong under the czars. Even the capitalists, when they arose, were but mere "industrial courtiers" subject to the state. And the peasant village, on the other hand, was a kind of Communism in practice even under the czars.

When he passes to Germany, similar social conditions as in Russia do not show themselves. "But whereas in Russia the factor of the state was everything, in modern Germany the political factor of the monarchy was largely a screen behind which a self-reliant class of industrialists was building up its own might. This might was not in wealth alone, which in times of acute revolution may add but little to resistance power. It was in the form of a highly complex and delicately adjusted economic mechanism, on which even avowed revolutionists would shrink from laying inexperienced hands."

"Doubtless," he continues, "the strangest single factor which caused the extreme divergence of paths between the Russian and the German revolutions lay in the conditions of their respective peasantries." The German peasants backed the industrialists.

Theories Smashed by Facts

In Germany, he again traces divergence from the accepted Marxian theory. There is "no tendency of the middle class to disappear, predicted by Marx." He finds in Germany, and dramatically traces, the conflict as between the intellectuals and the unionists revealing the present triumph of the trade unionists. "The German labor movement has therefore shelved, perhaps for good, its former radical anti-capitalism and is endeavoring instead through economic and political pressure to get for labor the maximum from capitalism." Again, "German trade unionism is fully aware that improvement in German labor standards depends upon a continuous solving of these problems."

In England, he views the "oldest continuous labor movement in the world." He finds there the temporary ascendancy of intellectuals largely because the trade union leaders were failing to meet the every-day, practical problems on the industrial field with aggressiveness.

He finds again the accepted Marxian theories do not hold good. "If industrial

(Continued on page 24)

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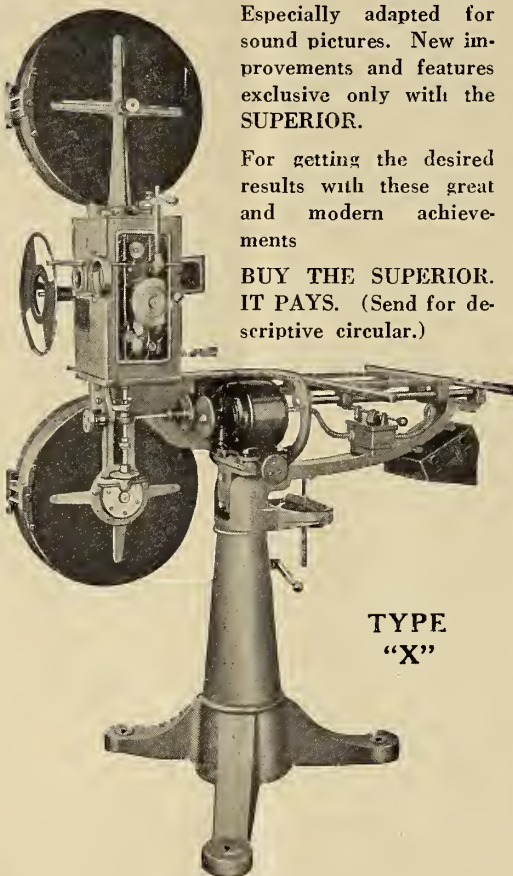
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(Continued from page 13)

as the electrolyte, which in the case of the lead cell is a 20 per cent. solution of sulphuric acid. It is important to have the electrolyte at the right strength or the cell will not function properly. The

1. It has a low internal resistance and therefore delivers a very strong current.
2. Due to the absence of polarization, as in the primary cell, the current output does not decrease as rapidly.
3. The charging process requires con-

reostat must be connected in series with the charging circuit, otherwise an excess of current will flow and probably render the battery, and possibly the generator, unfit for use. This is due to the fact that a storage cell possesses very low internal resistance.

An elementary charging circuit is shown in Fig. 2, where the brushes of the generator, E. F., are connected to the positive and the negative terminals of a 30-volt battery with a regulating resistance, R, connected in series. The resistance of R varies with the normal charging rate of the particular battery under charge—from 5 amperes in the smaller type cells to 50 and 100 amperes in the larger types. The resistance coil may be of fixed or variable value. It is sometimes fitted with a single-blade switch, permitting a portion of the coil to be short-circuited to provide two values of charging currents, and is made up of a resistance wire alloy constructed to withstand a continuous flow of current at the normal rating of the battery without overheating.

When the circuit from the charging generator is closed, current flows from plate to plate through the electrolyte until the surface is converted to active material, the process requiring several hours, according to the degree to which the cell has been discharged. In any case, the charging should continue until there is no further rise in either the specific gravity or the voltage.

It should be kept in mind that the voltage of the charging dynamo must always exceed the maximum voltage of the storage battery, because, the voltage of the battery exerts a back pressure or counter e. m. f. on the charging source, and if the voltage of the dynamo is less than that of the battery the latter will not be charged.

The resistance of the series charging rheostat for a given battery may be determined by Ohm's Law. Assuming that the battery in Fig. 2 has, when fully charged, a voltage of 30 volts, that the normal charging rate as given by the manufacturer is 6 amperes and that the voltage of the generator is 110 volts—then the battery exerts a back pressure of 30 volts on the generator, and the net effective voltage is 110—30, or 80 volts.

(Concluded in Next Issue)

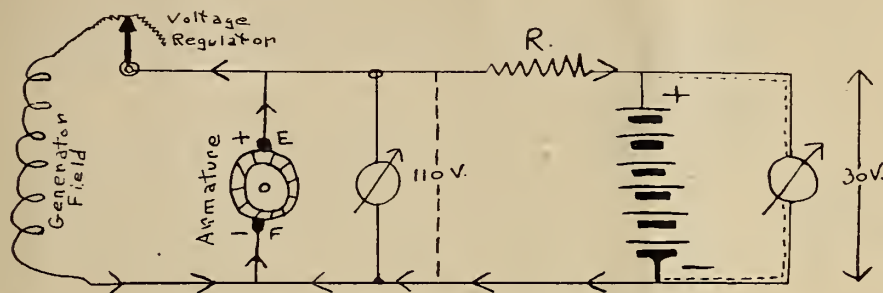


Fig. 2.—Diagram of simple charging circuit

strength of the electrolyte or the proportion of the acid to the water is expressed in terms of *specific gravity*.

The specific gravity of a compounded solution is a measure of its density or weight, as compared with that of chemically pure water. If water be taken as unity (or 1) it is found that certain compounded solution of acid, etc., are heavier than water by a certain amount. Thus, the specific gravity of the electrolyte of one type of lead plate storage cell is approximately 1.215, meaning that if a cubic centimeter of water weighs one gram, one cubic centimeter of the electrolyte weighs 1.215 grams. It is evident, therefore, that the greater the proportion of the acid in the electrolyte of a storage cell, the higher will be the reading of the specific gravity.

The gravity of the solution of a storage cell is measured by an instrument known as a *hydrometer*. The long glass rod A-B has the bulb at one end loaded with a shot of mercury. When dropped into a solution of acid it sinks to a certain depth, depending on the weight of the liquid. If placed in chemically pure water, the hydrometer would sink to the bottom, or at least to below the level of the liquid. But if it is placed in a dilute solution of sulphuric acid, a part of the tube protrudes above the surface.

The reading of the hydrometer scale at the surface of the solution is a measure of the specific gravity. The specific gravity of the chloride portable storage cell varies between 1.205 and 1.215, and for the Exide cells between 1.280 and 1.300.

Rating the Cell Capacity

The capacity of a storage cell is rated in amperehours. The amperehour is the unit employed to express the equivalent quantity of current represented by current of one ampere flowing through a given circuit for an hour. The storage cells now used are rated at from 60 to 224 amperehours, according to the power of the particular installation. The cells of larger capacity are used for auxiliary lighting service as well as for operation of horns and tubes for talking pictures.

Fundamental Facts on Cells

The projectionist should bear in mind the following facts concerning the storage cell:

siderable time—a matter of hours—to convert the surface of the plates to so-called active material.

4. During the charging period a stated number of amperes must pass through the cell, the actual value being designated by the manufacturer.
5. A normal rate of discharge is given by the manufacturers which was not to be exceeded except in special types.
6. The fully charged voltage of the lead cell averages 2.1 volts on open circuit, with values as high as 2.5 or 2.6 being obtained with the charging current flowing.
7. The lead cell is said to be discharged when the voltage of the individual cell falls to 1.7 or to 1.8 volts, providing the reading is taken at normal discharge current.
8. The fully charged voltage of the Edison cell is 1.2 volts; it is said to be discharged when the voltage of the cell, at normal discharge rates, falls to .9 volts.
10. The Edison cell and the lead cell differ both in material, general construction and electrolyte.

How to Charge a Cell

A storage battery is charged by connecting the positive terminal of the battery to the positive terminal of a direct current dynamo, and the negative terminal of the battery to the negative terminal of a dynamo, but a resistance or regulating

The Voltage Transformer

The voltage transformer is in principle an ordinary constant potential transformer especially designed for close regulation so that the secondary voltage will be as nearly as possible a fixed percentage of the primary voltage. The secondary voltage can never be exactly proportional to the primary voltage or exactly opposite in phase to the primary voltage on account of losses in the transformer and the magnetic leakage between coils.

There are two classes of errors in voltage transformers, ratio error and phase angle error. The part of these errors due to the exciting current is constant for any particular voltage. The part of errors due to load current varies directly with the load and is minimized by making the resistance and the reactance of the windings very low.

Reopen Eastern Studios

Warner Brothers have reopened their studio in Brooklyn, N. Y., and construction of the largest sound proof stage in the world is now under way there in anticipation of a busy recording season.

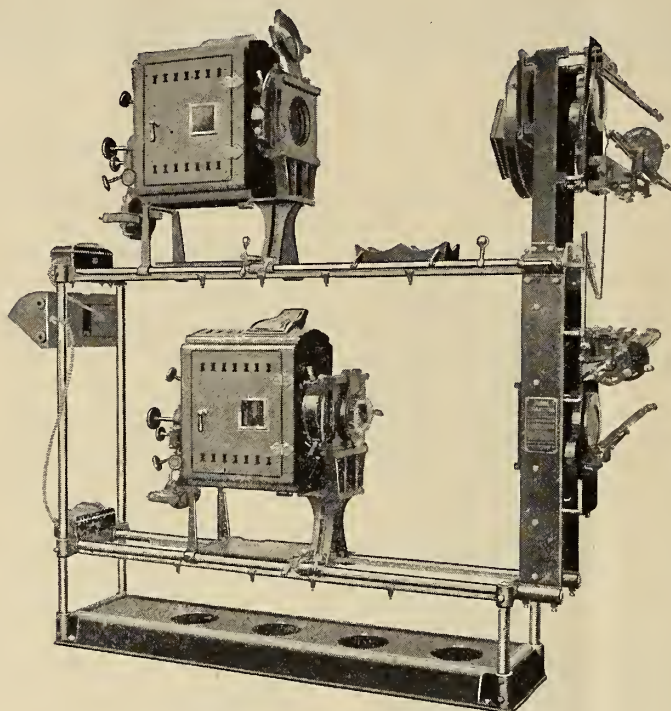
Paramount-Famous-Lasky also have reopened their Astoria, L. I. studio for sound picture work. Several experimental laboratories have been set-up here with an eye to the most efficient and economical process of sound recording.

Both of these studios were closed at the time of the general exodus of picture companies to California.

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What May We Expect of Television?

(Continued from page 10)

screen in the last sixteenth of a second, so that the disconnected dots appear as a complete pattern. The moving picture effect is due to a constant flood of new dots as the earlier ones are fading out of sight.

Synchronization

One problem is to provide the proper relationship between the transmitting and the receiving scanning disks, for otherwise our image has the same grotesque appearance as those trick mirrors at the amusement park. This is done by means of a delicate speed control of the motor at the receiving end, together with a short-circuiting button for the resistance in circuit, causing a momentary spurt of the motor speed. This is the crude synchronizing means usually employed. It takes about the same sort of skill to keep the television image in step as it does to steer an automobile down the center of the road.

Our television image is not unlike the pattern of dots of the usual halftone engraving, except that it is of a far cruder order than even the newspaper half-tone. The latter usually has 65 rows of dots to the linear inch, and is therefore called a 65-line screen. There are 4,225 dots to the square inch. Everyone is familiar with the very modest amount of detail obtainable with such a screen.

In present-day television, in order to present a cruder image of say 50-line texture, or 2,500 dots to the square inch, we must transmit 2,500 dot elements in one-sixteenth of a second, or at the rate of 40,000 dot elements per second! Our experiments so far lead us to believe that with single side band transmission it is necessary that the kilocycle frequency band be at least one-half times the number of dot elements per second. A 50-line image means a 20-kilocycle band. A 100-line image means an 80-kilocycle band.

The Time Element

If we refer back to our newspaper halftone, we note that an image three by five inches is about as small as we can possibly use for the general run of scenes. It would be a mighty small window to look out upon the world. Yet such dimensions call for an image 150 lines high and 250 lines wide, in the case of the 50-line texture, or 37,500 dot elements to be transmitted in one-sixteenth of a second!

We have accepted the 100-line image as the minimum for even a bluff at commercial television. That means a picture about 1½ by 1½ inches square, with fair texture.

But where are we to get an 80-kilocycle band? The Federal Radio Commission is hard pressed trying to find room for broadcasters who require only a 10-kilocycle band. Many broadcasters are being thrown off the crowded air. Of course, the short-wave end is the only place where we can even hope to accommodate any new-comers. And with the avalanche of requests for short-wave channels not only here but abroad—and remem-

Today and Yesterday

In 1890 one man produced about half a ton of coal; today he produces about four tons and the machinery is developed to increase this to twelve tons. This comparison was made by Arthur Huntington of the Iowa State Board of Education and was quoted by F. R. Low in a recent issue of "Power."

During the same period the following increase in output per worker has taken place: From 100 square feet of lumber to 750 square feet. From 500 pounds of iron to 5,000 pounds. From one-fourth pair of shoes to 10 pairs. From 20 square feet of paper to 20,000 square feet. From 55 square feet of glass to 3,000 square feet. An expert nail maker used to make 5 pounds of nails in 12 hours. The output in the nail industry today is 500 pounds per day of eight hours.

Of course this gain is not all net. Human labor is necessary to make the machines that are used up in the generation, transmission and application of this power.

ber, the short-wave transmitter makes a neighborhood out of the entire world—it is difficult to see where an 80-kilocycle channel is going to be found. The only hope is that the Federal Radio Commission will make room for just one power television transmitter, centrally located, which will be capable of doing a nationwide job during the experimental development of this new art, with radio "lookers-in" invited to take part.

Present Technique Poor

Even with a 100-line image, we cannot expect much by way of results. We may perhaps recognize a face, because such details as teeth, eye brows, cigarette smoke and tie will be noticeable. However, outside of simple forms and limited sized images, we cannot hope to see a baseball game, a prize fight or anything of that category—not so long as we are working with our present technique.

The various systems now being exploited with 20-line images or less are absolutely crude and hopeless. The face on the screen, for instance, can rarely be identified. Only simple things can be transmitted. It is extremely difficult to maintain synchronism, or an undistorted image, for more than a few fleeting seconds.

Nevertheless, please understand that as impractical as this television thing is today, it affords no end of fun from a purely experimental standpoint. The writer has had an enormous kick out of simple television experiments. It reminds us of the old days of the crystal detector, headphones and hit-or-miss radio entertainment. Then we were interested in the *means* rather than the *end* of radio. Television is just that all over again, with more thrills because the technique is so much more involved. And there is always the feeling in such work that you may be the lucky one to stumble across the missing link.

As an experiment, then, television is here. Play with it—it's great sport! But, as a commercial proposition, it's many, years away—unless someone stumbles across something radically new and better.



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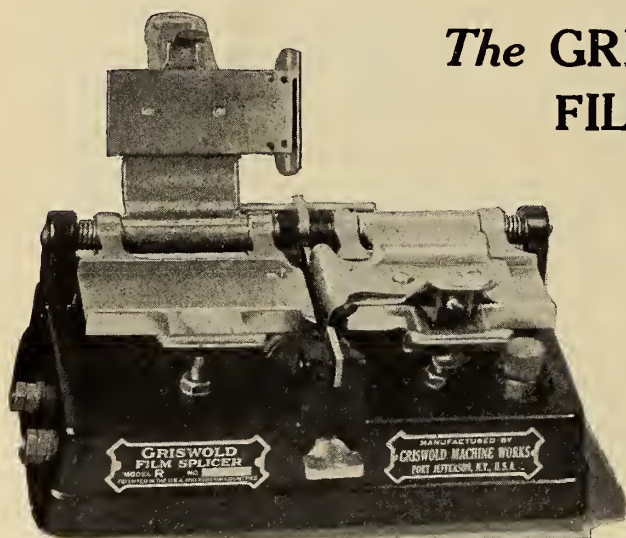
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Job vs. the "Movement"

(Continued from page 19)

capitalism has therefore been, with one hand, engaged in raising its own potential 'grave-diggers' in the shape of a wage-earning class, as Marx said, it has, with the other, sufficiently contradicted that by multiplying potential defenders for itself." In this instance, the white-collar class.

He finds the situation in England not altogether satisfactory. "In the party itself, the leadership which is emotionally wedded to intellectualist slogans, will either have to learn realism or else yield place to leaders from the trade unions."

It is his analysis of the conditions that produced the policies, and the policies themselves, of America labor that is to us of immediate interest.

American Labor Faces Facts

American labor has never been dominated by intellectuals. The Knights of Labor were, and that organization was superseded by the American Federation of Labor. The American Federation of Labor is a going concern today because it correctly read the native conditions and the national psychology. His account of the origin of the Federation is important.

"He studied Marx and the other European socialists, but they were also constantly testing to see what appeals were 'taking' with the workingmen so that they came in as permanent members, and what appeals had only an ephemeral effect. It was in this unusual school, in which theory was mixed with direct experience, that they discovered that the union card was the only real bond that held wage earners together—not politics, whether 'green-back' or socialist. They found that a labor movement became proof against disintegration only when it was built around the job.

"These discoveries did not at first estrange them from socialism as a program for the future. But as time went on and they became engrossed in their 'job unionism,' which eschewed politics and every other quick social panacea; as they watched their organizations grow from nothing to something like the large and stable British 'Amalgamated' unions, from which the International Cigar Makers' Union, reorganized by Strasser and Gompers, copies its comprehensive benefit features and centralized financial management; and as they observed with pride how their organizations, small though they still were, held together and grew steadily, in defiance of the alternating tides in business conditions so fatal to the labor organizations which had preceded theirs; then the original socialistic class-consciousness of these 'philosophers-organizers' gradually paled if not shriveled, and in its place flourished a robust trade unionist 'job and wage consciousness.'"

It is this job-consciousness that he finds the driving force of American labor.

"The ideology of the American Federation of Labor was both an urban and a wage earner's ideology. It was based on a consciousness of limited job opportunities—a situation which required that the

(Continued on page 30)

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Voice in Plane Heard 2,000 Feet Below

A man speaking in an ordinary voice in an airplane more than 2,000 feet above Curtis Field, N. Y., was distinctly heard by an audience on the ground in a recent test of broadcasting from an airplane.

The experiment was intended as advertising for cigarettes. It involved the use of giant amplifiers capable of magnifying sound one hundred million times. The amplifiers, subject to manipulation which permits drowning out the sound of the motor, pick up and broadcast the voice of a person speaking directly into a microphone.

Infections of the voice were plainly noticed when the plane was directly overhead, but otherwise the wind carried away the sound.

Comparative Cable Costs

The cost of manufacturing cable has consistently decreased. In 1888 the cost of a 50-pair cable represented \$155 per mile of circuit, or \$7,750 per mile of cable. Today a 1,200-pair cable of No. 24 gage, containing 2,424 wires, can be installed for about \$13 per mile of circuit.

In 1892 some 20,000 miles of telephone wire were put under ground but in 1926, thirty-four years later, no less than 3,000,000 miles were added.

Light Sensitive Cells

(Continued from page 9)

passing a discharge between the anode and cathode.

The voltages used range anywhere between 200 and 550 volts. As a result, the deposited film forms a compound with the hydrogen; for instance, in the case of potassium, it is converted into potassium hydride. The film becomes colored as a result of the process. The hydrogen is evacuated and replaced by a small amount of any of the following gases: neon, argon, helium, krypton, or xenon.

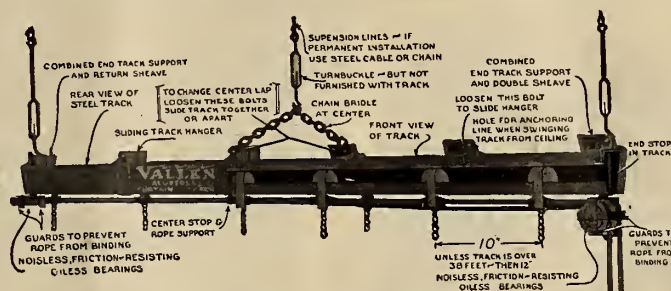
What happens in the conversion process is this: the deposited film is in a very fine crystalline state (the surface); i.e., in a colloidal form. The electrons are more readily disassociated than when the active metal is not converted into the corresponding hydride.

In the case of the gases referred to, we take advantage of the conducting properties of the gas in the cell. After an electron has been released from the surface it collides against the gas, and thus amplifies itself in the cell proper, prior to its reaching the electrical amplifying circuit.

Because of its dependability, and the modern amplifying circuits, the photo electric cell is used extensively in talking motion pictures. Its actual position in the projection equipment is familiar and need not be discussed here.

The actino- and photo-voltaic cells are not yet widely used even in experimental work on talking pictures, but they present interesting and promising possibilities.

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A new switch, the design of which is based upon the fact that an electric current will not travel through a vacuum, has been perfected by R. W. Sorenson of the

California Institute of Technology, and, according to reports, is expected to produce radical changes in electrical transmission.

From a small glass tube all but one-billionth of the air was exhausted, and the switch in this vacuum was tested with a current of one thousand amperes at 43,000 volts. Although the switch opened a gap of only one inch, the current stopped instantaneously. The oscillograph record, which would show a thousandth of a second of after-disturbance, indicated a clear break of the circuit.

The new switch is expected to be of particular value in great city installations.



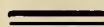
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Use of Tachometers

(Continued from page 11)

vated when more than one indicator is operated from one magneto.

In the new class of tachometers, the magneto generates a comparatively high potential, 3 to 6 volts per 1,000 revolutions per minute; has a low internal resistance, about 20 ohms, high output, and a high resistance in the external circuit, nearly all of this resistance being in the indicator. This class of tachometer, because of its high potential and high external circuit resistance is not so much subject to error due to poor electrical contacts or connections. The connecting wires may be made any length or diameter within reason, because their resistance is a very small percentage of the total resistance of the circuit. The magnetos and indicators require no special adjustment together with the connecting wires and are all interchangeable. The indicators are more rugged, and as many indicators as desired can be connected to one magneto because of the higher current capacity of the magneto.

General Construction

I will now describe a good example of the latter class. The magneto, which is part of the tachometer, is a direct-current generator having a permanent magnet field and a revolving armature provided with a commutator on which bear the brushes for collecting the current generated in the armature.

The distribution and uniformity of the magnetic flux across the air-gap is governed by pole pieces of proper shape and the permanency of the magnetic circuit is obtained by an exceptionally small air-gap and a magnet made of special steel, specially treated and aged.

The brushes and commutator segments are constructed of special hard, non-corrosive alloy, having an exceptionally long life. The brushes are definitely adjusted for proper position when the magneto is assembled. These and the commutator do not require any attention, except cleaning at yearly intervals, and the brushes are so arranged that they can be easily removed and replaced.

The armature is constructed so as to have unusual mechanical strength and is mounted in self-aligning ball bearings which permit extremely free rotation and which require no lubrication or attention of any kind. These are the only moving parts in the magneto.

The magneto is adjusted to generate an e. m. f. of 6 volts per 1,000 r. p. m. and to have an internal resistance of exactly 20 ohms. The voltage generated is directly proportional to the speed; that is the speed-voltage curve is a perfectly straight line. The terminal voltage may be adjusted to an exact value under different conditions of indicator load by means of a magnetic shunt which can be operated from the outside of the magneto case. After making final adjustments the shunt is sealed.

The magneto should be so driven that its normal speed is between 1,000 and 2,000

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r. p. m., giving a normal voltage of between 6 and 12 volts. This can be done by the proper size and arrangement of driving pulleys, gears, etc.

The magneto is compact and light, and can be mounted in any position. It can be driven from the machine whose speed is to be measured by means of belt and pulleys, spur gears, or direct connection to some shaft or rotating part running at a suitable speed. The power necessary to drive it is slightly more than $1/746$ horse power (one watt) which is less than the power required to drive any other tachometer at present on the market. Its accuracy is guaranteed to be within one per cent, although the accuracy will be greater than this under ordinary conditions. That this accuracy remains constant has been proven by severe laboratory tests.

Voltmeter Indicators

The voltmeter indicators used as part of the tachometer are of various forms and sizes to suit different conditions. The form commonly used with motion picture projectors is a fan-shaped instrument having a long and easily read scale and at the same time occupying but little space. It is designed to be mounted on a panel by means of two studs on the back of the instrument case; these studs also act as binding posts for the connecting wires to the magneto on the projector. The indicator has a double scale. The upper scale shows the film speed in feet per minute, while the lower scale shows the time necessary to project a thousand feet of film when running at the speed indicated on the upper scale.

All indicators are adjusted to have a resistance of 500 ohms per volt; thus, an indicator designed to be used with a magneto whose normal speed is 1500 r. p. m. would be adjusted to 9 volts and would have a total resistance of 4500 ohms. This is the large resistance which eliminates the possibility of errors due to poor connections and long connecting wires.

For instance, suppose the connecting wires were No. 14 B. & S. gauge copper, having a resistance of 3.1 ohms per 1000 feet, and that the indicator is at a distance of 250 feet from the magneto. The total length of the connecting leads would then be 500 feet and their total resistance would be 1.55 ohms. This .3 per cent of the total indicator resistance of 4500 ohms and would cause an error of only .3 of one per cent in the indicator reading, which would not be noticeable.

Its New Appliances

The guaranteed accuracy of the indicators is one per cent. This, combined with the magneto accuracy of one per cent gives a guaranteed overall accuracy of two per cent for the tachometer, although the probable error is much less than two per cent.

In conclusion, I might say that there are probably many new appliances in motion picture work where tachometers could be used to advantage, such as in airplane photography, where several motor-driven cameras could be mounted in different locations on the plane.

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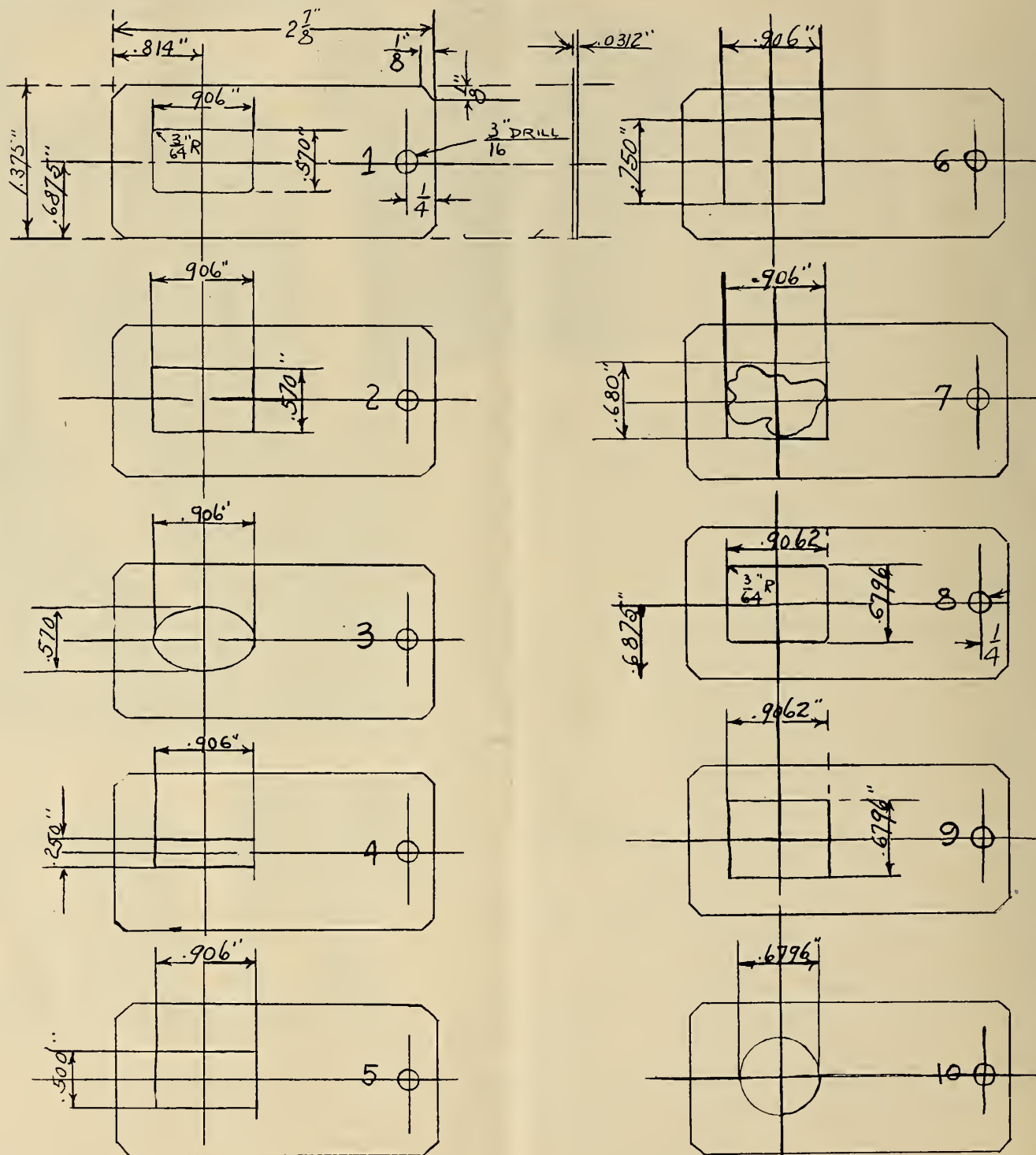
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(See page 32 for method of insertion)

Victor Co. to Have Large Hollywood Plant

A large plot of ground in Hollywood, Cal., situated a short distance from the studios of several important motion picture companies, has been purchased by the Victor Talking Machine Company as a site for a plant in which it will carry on its work of sound synchronization for films, according to a recent announcement by that company.

Work will start immediately on a record-pressing plant and in the near future a studio will be erected in which actual scenes from photoplays may be "shot" at the same time voices of players or other sound accompaniments are being recorded.

Not "Talkie" Competition

The purchase of this ground is a step in the development of sound synchronization which Victor inaugurated a few months ago. It is not the intention of the Victor Company in any way to compete with the film producing companies. It will be strictly a service company, providing picture producers with sound accompaniments for their photoplays, either in the form of complete synchronized scores arranged and recorded by Victor's expert staff and made after the feature films have been cut and edited, or in sound effects recorded during the actual photographing of the films.

It will also make records for any company which does its own recording. This latter work it has done for some time for the Vitaphone Company.

Vitaphone Co. and W. E. To Arbitrate "High Cost" Case

The Vitaphone Corp. secures a royalty of three per cent of the gross received by Electrical Research Products, Inc., from licenses under Vitaphone patents. This was set forth in the application of Warner Bros. for a listing of 350,220 shares of common stock on the New York Stock Exchange.

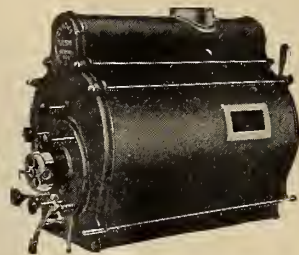
In connection with this, it is interesting to note that the complaint of the Vitaphone Corp. against Western Electric, charging the holding up of installations by the latter due to high cost of equipment, will be resumed immediately.

Joseph Schenck on "Talkies"

"Talking pictures are a novelty, and a badly done one, and will not last more than six months," Joseph M. Schenck, President of United Artists, is reported to have said recently in London. "We are not going to make talking pictures—at least, not until I am convinced that the public want them.

"I do not believe that the present talking picture craze is more than public curiosity in a novelty. . . . Sound is not adapted for full-length features, is unnatural and robs the picture of sincerity by its mechanical quality."

Tom Maloy
of Chicago Local No. 110
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(Continued from page 24)

individual, both in his own interest and in that of a group to which he immediately belonged should not be permitted to occupy any job opportunity except on the condition of observing the 'common rule' laid down by his union. The safest way to assure this group control over opportunity, —though also a way so ideal that only a union as favored as the printers' was able to actualize it entirely—was for the union, without displacing the employer as the owner of his business and risk taker, to become the virtual owner and administrator of the jobs.

"Where such an outright 'ownership' of the jobs was impossible, the union would seek, by collective bargaining with the employers, to establish 'rights' in the jobs, both for the individual and for the whole group, by incorporating, in the trade agreement, regulations applying to overtime, to the 'equal turn' to priority and seniority in employment, to apprenticeship, to the introduction and utilization of machinery, and so forth. Thus the industrial democracy envisaged by this unionism descended from Marxism was not a democracy of individualistic producers exchanging products under free competition, with the monopolist banished, but a highly integrated democracy of unionized workers and of associated employer-managers, jointly conducting an industrial government with 'laws' mandatory upon the individual."

"The unionism of the American Federation of Labor 'fitted' first, because it recognized the virtually inalterable conservatism of the American community as regards private property and private initiative in economic life. It, too, accordingly arrayed itself on the same side, demanding only that the employers should concede the union's right to control the jobs through 'recognition' embodied in the trade agreement; and in this attitude it remained unperturbed in the face of all the charges by socialist intellectuals of treason to labor or even of corruption.

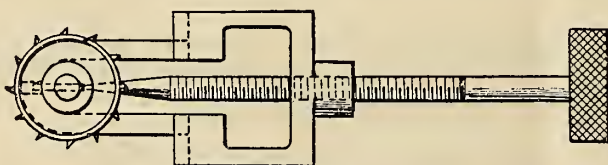
Saw America As It Is

"This unionism 'fitted' secondly, because it grasped the definite limitations of the political instrument under the American Constitution and under American conditions of political life. It therefore used the political weapon only sparingly and with great circumspection. It went into politics primarily to gain freedom from adverse interference by judicial authority in its economic struggles; it did not wish to repeat former experiences when trade unions standing sponsor for a labor party found themselves dragged down to the ground by internecine political strife.

"The American Federation of Labor made itself felt politically by exercising pressure on the old parties; but it kept politics at arm's length from its own cherished trade union organization. It must be acknowledged, however, that the American movement, led by leaders risen from the ranks, could withstand the political temptation with so much greater ease than the European movements, because it saw little to choose between an autocratic capitalist management of industry

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Local No. 1 Effects Seven-Hour Day

Local No. 1 (Stagehands) of New York recently announced a victory that establishes a new time scale for labor in this country and Canada. It consists of a seven-hour day for shop work, and is regarded as a signal advancement for this craft.

By the terms of the new agreement, the following changes will be made immediately in the wage scale: In the legit. theatres, the heads of departments will be raised \$7.50, thus bringing their weekly stipend to \$82.50. Assistants will also have a \$7.50 boost, making their new salary \$72.50. A \$6 raise will be given to extra men, thus making their pay \$54. The Sunday scale will vary, extra men being paid 75 cents per show.

In the shop, overtime will be increased 25 cents an hour, in addition to the adoption of the seven-hour day.

and a bureaucratic one by 'experts' appointed by the state."

Present Conditions

While approving of the past of American labor, Perlman finds in the present certain factors that are disconcerting. He pictures American business as a "welfare capitalism." He finds that it has made concessions to the common good which tend to disguise its ruthless anti-social objectives. These concessions have tended to arrest the growth of American unions. These problems can be met by the unions through making a larger technical contribution to the industry, through co-operation and through proving the union's social value. Even the intellectual may have a place in the labor movement if he gives up his Messianic complex, ceases shouting corruption at every turn, ceases bickering, gives up tactics that tend to disrupt, and becomes a quiet worker within the movement.

Quoting Karl Swing, Perlman concludes:

"A real democracy in industry depends on an organic unity in industry. Therefore a life and death struggle between the two factors, labor and capital, each of which remains absolutely indispensable in the present state of society, should be virtually ruled out from consideration. Labor fully admitted the correctness of this view when it gave up the tactics of catastrophic action. That was tantamount to an admission that the present is too deeply rooted in the past to leave the least possibility of a revolutionary change through a coup. Catastrophic change is least conceivable in modern economic society, since its issues are ever assuming more and more complicated patterns. During the recent German revolution, it was found that while the political constitution could indeed be altered in the revolutionary way, no such tactics could be effective in the economic order."

The book clarifies dark issues. It points clearly to objectives already fixed. It performs a distinct service.



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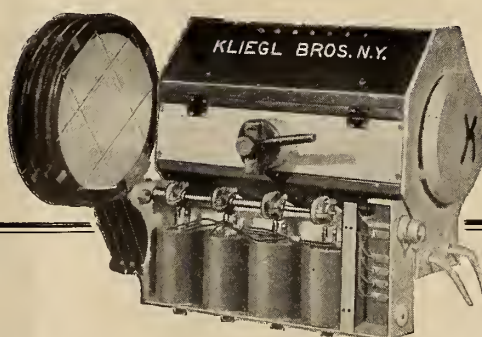
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How To Insert Aperture Masks

Shown on Page 28

ON page 28 of this issue there appears a group of diagrams of aperture masks designed and used by Art Smith, Supervisor of Projection at the Roxy Theatre, New York City. These diagrams were first published in the March issue of THE MOTION PICTURE PROJECTIONIST, and are reprinted in deference to the wishes of many new subscribers as well as to supply information to many recent inquirers on the subject.

Below there appears a diagram of the method of insertion of these masks. The exact measurements of each mask are given, and with aid of the diagram on this page one should encounter no difficulty in making up the masks.

Use Brass or Aluminum

The making-up of the masks should be entrusted to a good mechanic, not neces-

sarily an A-1 man, but certainly not to a shoemaker or candy butcher. They should be made of either brass or aluminum, preferably the former for best results.

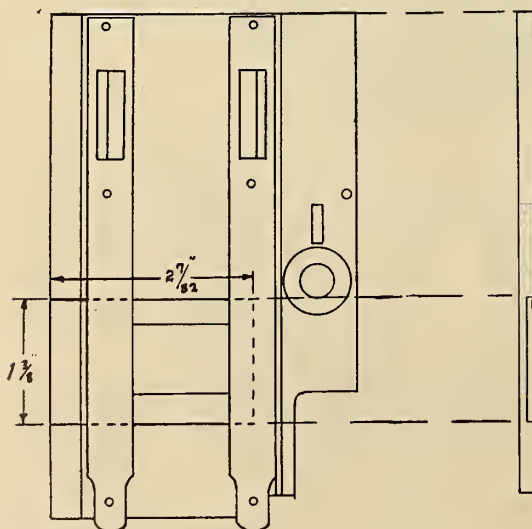
Additional copies of the diagram on page 28 may be obtained for the asking by writing to this magazine.

Mr. Smith has used all of these masks at the Roxy Theatre in New York with splendid results.

Additional drawings from Mr. Smith's extensive collection will appear in an early issue.

Mr. Smith has designed and is now using regularly a special mask for use with sound pictures (film method), about which many inquiries have been received recently.

A diagram and complete description of this mask will appear in the October issue.



Showing method of insertion of aperture masks shown on page 28.

Projection Room Hints

The projection room should be built of fireproof material, such as cement, brick or tile. Mats should be used on these floor surfaces to protect the health of the projectionist. If all projection rooms are strongly built and of ample dimensions, better work is assured as well as increased protection for the projectionist.

Ventilation of a projection room should be accomplished by means of a duct to the outside air, preferably with a suction attachment to insure a steady supply of fresh, cool air. There should, of course, be ducts to draw off smoke and other fumes which prevail in the room. The practice of extending theatre refrigerating systems to the projection room should be discouraged, as a safeguard of the projectionist's health. Also, radical changes of temperature are injurious to film.

Good Floor Is Essential

The projection room floor is very important to consider. No projectionist should tolerate a wood or a metal-lined floor. The former is wholly unsatisfactory, and the latter is dangerous and lasts only a short time before wearing through and making pockets for dirt.

The floor of the room should be kept absolutely clean, as much for the projectionist's convenience as for protecting the film. If necessary, the floor should be cleaned twice each day.

Working in close, stuffy quarters is injurious to the projectionist and does not permit maximum efficiency. Projectionists should insist on ample ventilation throughout the year.

50,000 Cinemas in World

According to a trade press announcement, there are 50,000 cinemas in the world at present. Of this number, 19,775 are in Europe and 20,500 in the United States. More than 15,000 features and thousands of short subjects are required yearly for these theatres.



Group photograph of delegates to N. Y. State Association of Projectionists' meeting at Rochester. Among those shown above are the following who played a prominent part in the proceedings: International Vice-President William Harrer, G. Harry Brophy, Rochester; Glen Humphry, Utica; E. T. Stewart, New York City; Burt F. Ryde, Buffalo; Claude Linstruth, Syracuse; Harry Brooks, Troy. Second from the extreme right is Boone Mancall, publisher of THE MOTION PICTURE PROJECTIONIST.

New York State Association Meets

REPRESENTATIVE projectionists from all over New York State met at Rochester on Monday, August 27th, for a conference. Delegates were present from the following cities: New York, Buffalo, Troy, Schenectady, Binghamton, Little Falls, Utica, Oswego, Rochester, Yorkville, Syracuse, Glens Falls, and Geneva.

Upon their arrival in the morning the delegates were taken to the Bausch & Lomb Co. plant in cars furnished by Rochester Local Union 253 under the guidance of President Brophy and Calvin Bornkessel, Chairman of the Arrangement Committee.

Visit B. & L. Plant

At the plant they were shown the process of manufacture of motion picture projection lenses and reflectors, from the original pouring of the molten glass to the final stages of precision grinding and polishing. At the testing laboratories the Bausch & Lomb technicians explained the methods of testing for the elimination of aberration, coma, and other defects. This demonstration was very instructive and of great value to the projectionist delegates, in whose work a knowledge of optics is so essential. This tour through the plant was under the guidance of J. L. Nixon, Sales Manager for B. & L.

Following a luncheon given at the Shore Hotel at Ontario Beach, the delegates were taken to the Eastman Kodak plant, where they were shown the process of film manufacture, from the basic ingredients to the final perforation of raw stock before delivery to the studios and laboratories. This visit, under the direction of Mr. Gillette, was indicative of the great care and precision work necessary to maintain a high standard of uniform product.

Upon returning to Fraternal Hall, the afternoon business session was called to order by President Graf. Several telegrams and letters from delegates who were unable to be present because of the press of work at the opening of the new season were read.

The minutes of the first meeting held last Spring at Utica were read and approved. A Committee on Constitution and Resolutions was named. Boone Mancall, Editor of THE MOTION PICTURE PROJECTIONIST, addressed the conference, touching upon the talking picture situation, its future and promise of great possibilities for the craft, and stressing the sincere desire to make THE MOTION PICTURE PROJECTIONIST serve the craft.

Vice-President Harrer of the International Alliance conveyed the greetings of the I. A. officers to the delegates and assured them of his cooperation in promoting any constructive policies they might formulate. Secretary Glen H. Humphrey read his report, which was approved by the conference.

Report Important Resolutions

At the evening session Chairman E. T. Stewart (N. Y. City) of the Resolutions Committee tendered the report of the committee on several resolutions, probably the most important of which was that concerning the six-day week for projectionists; next in importance was the resolution applying to the jurisdictional rights of projectionists over all sound reproducing equipment in conjunction with projectors.

Harry Brooks of Troy was added to the Legislative Committee. Mr. Brooks has

served in the State Assembly and should prove a valuable addition to this committee.

Election of Officers

The following officials were retained in office, with the addition of G. Harry Brophy, of Rochester, to the Executive Board as Vice-President; President, Paul Graf, Buffalo; Vice-President, A. H. Robinson, Niagara Falls; Secretary-Treasurer, G. H. Humphrey, Utica.

On the Executive Board, in addition to the officers, will be G. Edward Costello, Schenectady, and Hubert Hecox, Iliou. The Legislative Committee is comprised of E. T. Stewart, New York, Chairman; Albert Ryde, Buffalo; Harry Brooks, Troy, and G. H. Humphrey, Utica.

During the day many of the delegates had visited the model projection department of the Eastman Theatre in Rochester, and at the evening session Lewis M. Townsend, Supervisor of Projection at this theatre, spoke briefly of the increasing importance of the well-trained projectionist in the industry and of his observations confirming this fact in his trips about the country.

A vote of thanks was given Rochester Local 253 for the splendid arrangements made for the conference and the hospitable manner in which the delegates were entertained.

Following adjournment of the evening meeting the delegates joined with the entire membership of Local 253 as their guests at a midnight supper and entertainment that did not conclude until, as they say, the "wee sma' hours." All were agreed that the conference had been productive of very beneficial results, and that it augured well for the future usefulness of the Association.

Additions to Nomenclature

ADDITIONS to "Projection Nomenclature," published last month are offered in the following letter from Francis L. Hill of St. Petersburg, Florida:

Editor, M. P. PROJECTIONIST:

In response to your request for corrections to "Projection Nomenclature," which appeared in the August issue, I would like to offer the following suggestions. As far as the nomenclature is concerned, it is all right. However, some of the definitions included therein, if taken literally, are not specific.

APERTURE—The opening through which the light passes between its source and the screen. The film passes vertically at the aperture.

"The opening . . ." Is this the only opening the light passes through? Why not specify that it is the opening that forms a mask or frame for the picture? Also, if the projector is inclined, for instance, 20 degrees from the vertical, how can the film pass vertically?

FRAME (verb)—The operation of correctly aligning the picture on the screen. Framing is accomplished by moving a lever or some other device.

This should be more explicit and should state that it is the operation of aligning the picture up or down on the screen. Framing will not align the picture laterally.

GENEVA MOVEMENT—A form of intermittent movement first used in Geneva, Switzerland; hence the name. It is the form of intermittent movement that is most used.

This is very interesting; but why not definitely distinguish a Geneva movement from any other type of movement?

INTERMITTENT—The device that moves the film normally at 16 frames per second.

This is very indefinite. The top sprocket, intermittent sprocket, lower sprocket, and the mechanism as a whole "moves the film normally at 16 frames per second."

Sixteen frames per second is also rather misleading. It is time this old standard was changed to 24 frames per second, as the average projection speed today is 90

feet per minute. A picture projected at 60 f.p.m. would be rather slow in action, to say nothing of the flicker that would result if the average projector was run at that speed.

That Word "Operator"

OPERATOR—The individual who manipulates the projection apparatus.

This term should be discarded in favor of "Projectionist," but will have to be tolerated until the I. A. changes from "Operator" to "Projectionist."

Your distinction between operator and projectionist is true enough; but the individual who can "manipulate the apparatus" but who knows nothing of the theory and correct practice of projection has no business in a projection room. So why keep the term.

SPROCKET WHEEL . . .

Why "wheel?" Isn't "sprocket" alone sufficient?

TAKEUP—The device used to wind the film as it passes through the projector.

This should read: The device used to wind up the film after it has passed through the projector mechanism.

THROW—The distance from the screen to the projector.

To what part of the projector? Light source, film plane, objective lens, or just wherever one finds it handy to measure to?

TRAVEL GHOST—The peculiar hazy appearance often seen in a motion picture. It is produced by the improper setting of the revolving shutter.

This is not so good. Other things such as dirty objective lens, lens incorrectly assembled, picture out of focus, stray light reaching the screen, etc., could cause a hazy effect.

The definition I would suggest is: The appearance of white streaks or blurs from white objects in the picture, most noticeable on titles with a black background, caused by improper setting of the revolving shutter.

These suggestions are offered in a spirit of constructive criticism to make some points clearer to your readers.

FRANCIS L. HILL.

Sunspots Called Greatest Known Refrigerators

The most powerful refrigerating machine known to science is a sunspot. So says Dr. Donald H. Menzel, of Lick Observatory, California, in a recent leaflet on sunspots distributed to its members by the Astronomical Society of the Pacific. The center of a sunspot may be two thousand degrees cooler. Dr. Menzel asserts, than is the surrounding surface of the sun. The spots are often many thousands of miles across.

When a continuous cooling of two thousand degrees over millions of square miles is contrasted with the forty or fifty degree cooling which is the best we can do with our tiny iceboxes, justification is apparent for Dr. Menzel's statement that sunspots rank first as refrigerators. It is probable, he goes on to say, that the cause of the cooling in the sunspot is exactly the same as in the small "iceless" refrigerators now coming into household use.

This cause is the expansion of gas, for gas always cools as it expands. In the iceless refrigerators the gas is compressed by the pump and is then allowed to expand, so that its cooling power is utilized. In the sunspot the rapid whirl of the whole spot, like the whirl of a terrestrial cyclone, lowers the pressure at the center of the sunspot so that the gases expand and cool.

St. Louis & Milwaukee Scales Rise

The wage settlement recently negotiated in St. Louis carried with it a \$4 weekly decrease for musicians, a \$10 increase for stagehands and a \$5 advance for projectionists. The number of men in the projection room for sound pictures was also increased to two, the minimum number permitted.

Higher wages for projectionists will also prevail in Milwaukee during the ensuing year, according to an announcement by the joint committee of exhibitors and projectionists. The amount of the increase was not stated, but it is believed to be substantial.

S. M. P. E. Fall Meeting at Lake Placid, N. Y.

THE Fall Meeting of the Society of Motion Picture Engineers will be held at Whiteface Inn, Lake Placid, New York, September 24th to 27th inclusive. This meeting promises to be one of the most interesting ever sponsored by the Society, according to an advance list of the papers which will be read and the demonstrations given.

This convention will assume the aspect of a symposium on sound recording in conjunction with motion pictures. There will be six papers by members of the Bell Telephone Laboratories, including practical demonstrations and the very latest Western Electric sound recording appa-

ratus will be installed in the convention room. Among the various papers on sound pictures scheduled to be read are the following: "The Quality of Speech and Music," with demonstration; "Sound Reproduction in Theatres," "General Principles in Sound Recording," "Methods of Synchronizing," "Light Valve Recording," "The Three Electrode Vacuum Tube and its Application in Sound Recording," "Characteristics of Photo-Electric Cells," and "Acoustics of Theatres."

There will also be a series of papers by staff members of the Research Laboratories of the Eastman Kodak Co., including a description and demonstration of the new Kodacolor process of motion pictures in color. Of particular interest to projectionists will be the paper to be read by J. F. Leventhal on "A New Intermittent Optical Projector."

There will also be a session devoted to

announcements of new apparatus by manufacturers, in accordance with the Society's long-standing custom of offering to all manufacturers gratis an opportunity to describe their recent apparatus, products, or processes.

Lake Placid at this season of the year will provide a brilliant setting for the Society meetings, and the session promises to attract a record attendance. The Arrangement Committee has announced a program of entertainment between sessions.

Electric Sign on Plane

An electric sign with letters six feet high was flown over New York's bright light district recently, in the first test of electric advertising by means of airplanes with Neon lights on the lower wing surface. The sign was clearly visible to persons in Times Sq. when the plane was 2,000 feet overhead.

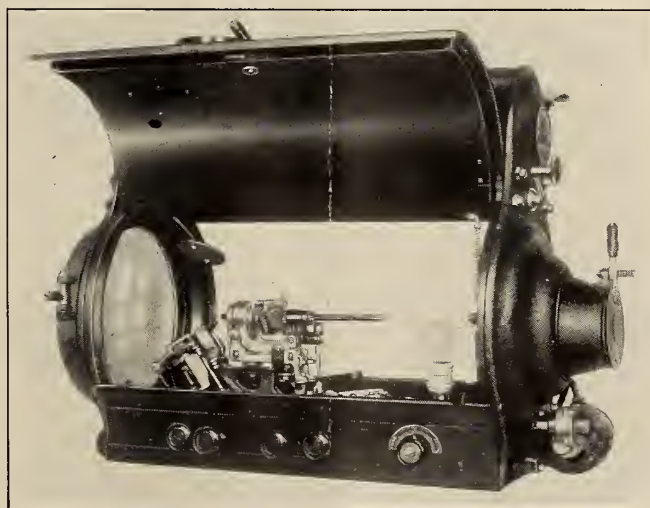
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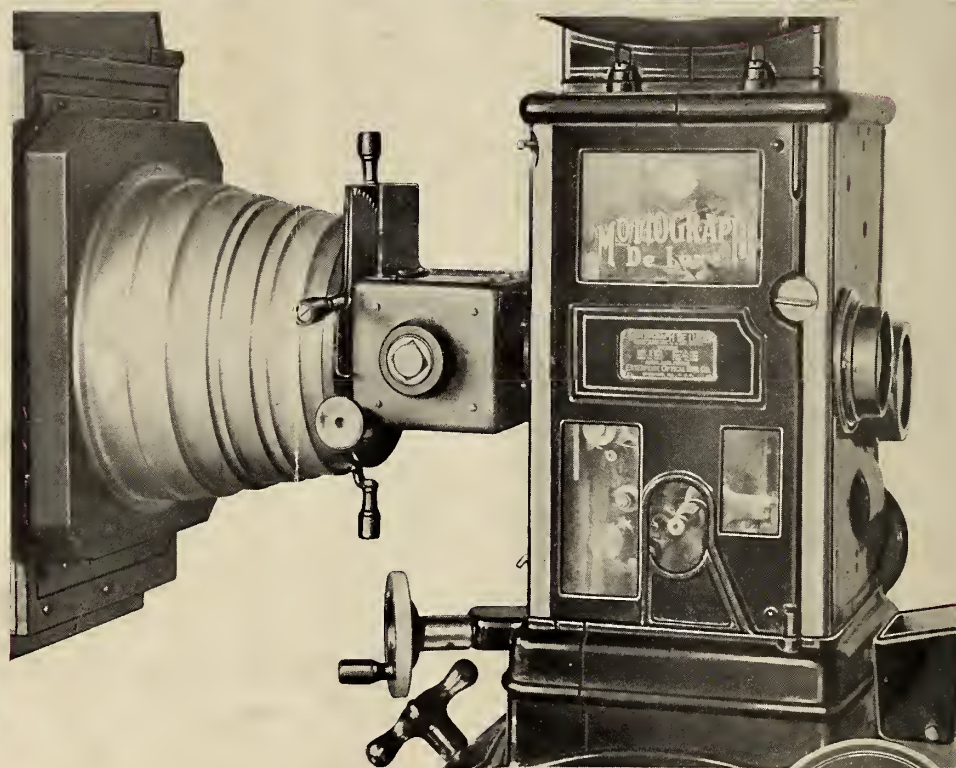
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